

MARINE REVIEW.

VOL. IX.

CLEVELAND, O., AND CHICAGO, ILL., MARCH 22, 1894.

No. 12.

Lake Freight Outlook.

One of the Missabe mining companies, the Biwabik, engaged some tonnage recently at 80 cents from the head of Lake Superior, the contract as regards time being even a little less favorable to the vessels than those made two weeks ago. Aside from this there is nothing new in the way of ore contracts. Owners who have not taken any of the 80-cent ore still insist that many of the vessels that have taken it must, in view of the very unfavorable outlook in coal freights, be operated at a loss, and at a very heavy loss if there is any improvement toward the close of the season. All owners who have ore contracts are, of course, watching very earnestly for a move on the part of dealers in soft coal to make contracts for carrying coal to the head of Lake Superior. A few vessels have been chartered for single cargoes, to go to the head of the lakes on the opening at 40 cents, but this rate will not be paid on contracts. In fact it is well known that some owners who have 80-cent ore would take blocks of coal for the head of the lakes at 35 cents, but even this figure is not offered.

There is only one encouraging feature, aside from all the depressed conditions that mark the opening of the season, and that is the certainty of enforced idleness on the part of a large portion of the lake fleet for some time to come, notwithstanding the fact that the general starting of vessels might, if it was desired, be the earliest in lake history. Although appointments of masters and engineers have been made in most cases, many of the boats will probably remain at the docks after the Chicago fleet has started, and a large portion of the Chicago fleet will be laid up at Lake Erie ports upon arriving down. This is not the result of any concerted action on the part of the vessel owners. It is a condition on which owners are decided as individuals, on account of the absence of cargoes in the present outlook. Shippers are as a rule satisfied to grant requests that will enable owners to delay a general movement of their vessel. In the end this feature of the situation must result somewhat to the advantage of the vessels.

Lower Prices for Fuel.

At a recent meeting of the finance committee of the Lake Carriers' Association, two or three propositions from coal dealers to furnish fuel to steamers at a little less than \$2 a ton were talked of. In all cases the fuel dealers wanted the vessel owners to make contracts for large blocks of the coal. As an organization, the Lake Carriers' could not well consider such propositions, but one of them at least has since been taken up by a half-dozen large owners, who figure that they can make a contract to take about one-quarter of their fuel in Cleveland, and thus obtain the advantages of the price offered, \$1.90 on 50,000 tons. The vessel owners' relations with the coal shippers who furnish them cargoes are a draw-back to such deals, but in the case under consideration it is the intention to have the coal taken by boats going up the lakes without cargoes. It is generally expected that there will be better than 25 cents a ton all around taken off the price of fuel this season.

Electricity on the New York Canals.

Frank W. Hawley of Pittsford Farms, near Rochester, vice-president of the Cataract General Electric Company, has received a fifty-year permit from Superintendent Edward Hannan of the New York state department of public works, for his company to put in an electric plant along the lines of the state canals. The company will obtain its electrical power at Niagara Falls, from the Niagara Power Company, and transmit it to Albany along the line of the Erie canal. There is another company, having the same directors as the Cataract company, called the Erie Electric Towing and Power Company, with its principal office in New York city. This company proposes to construct and put in operation a half dozen tugs, operated by electricity, either on the storage or trolley system, with the view of showing the adaptability of electricity to canal navigation. It is intended to have the tugs tow for a moderate consideration, any horse-boats the captains of which desire to avail themselves of such method of navigation. The two companies are subsidiaries of the parent concern, the Niagara Power Company. The permit authorizes the Cataract company to enter upon all canal lands of the state for the purpose of constructing either on, or over, or under either canal bank a system for propelling canal boats by electricity, without interfering with the present method of operation. Central power houses may be erected. The rates for towage shall be subject to modification and review by the state superintendent of public works, but such rate shall not exceed \$20 per electrical horse

power for any season of navigation. An important provision is that the company may, so long as the wants of the canal are supplied, employ its electric plant along the line of the canal in furnishing electric light, heat and power for distribution to any point or points beyond the line of the canal, and thus may furnish electricity for lighting and power purposes in all the cities and villages along the canal. The company is to furnish the state, free of charge, sufficient power to operate motors to open all gateways leading to and from locks, and also electric lights sufficient to properly illuminate such locks at night. The company must have its plant in operation on the Erie canal between Buffalo and Albany within three years from date.

The Harter Law.

The Federal Reporter, Vol. 69, No. 5, contains in full the decision of Judge Brown of the United States district court, New York, in the case of Hawkins vs. the schooner Viola, in which the first ruling of the federal courts on the questionable features of the famous Harter law was secured. In this decision the court says that the general words of a statute may be limited to the subject matter to which the statute relates, as indicated by preceding or following words, and it is held accordingly that section 3 of the act in question, providing that under certain conditions, "neither the vessel nor her owner," etc., "shall be held responsible for loss resulting from faults in navigation," applies only to the claims for loss to cargo on board the vessel in fault, the preceding and following words indicating that the statute is dealing only with the relations between carriers and the cargo on board.

It may not be out of place here to note that this is precisely the construction put upon this law by Mr. Harvey D. Goulder of Cleveland and printed in the REVIEW early last spring, when eastern underwriters were greatly worried about it.

High Speed in Big Engines.

Although early announcements were to the effect that the second of the big Northern Line passenger ships will be out in August, it would seem like a physical impossibility to prepare the boat for a trip during the coming summer. Work on both machinery and boilers for the second boat can be gotten along more rapidly than was the case with the Northwest, but the builders, who understand the great amount of detail entering into these ships, aside from the hulls and main engines, are not responsible for the predictions as to the time of their completion. Mr. Frazier, who was chief engineer of one of the freight boats of the Northern Line last season, has been appointed chief engineer of the Northwest. The number of revolutions per minute put down for the massive engines of the Northwest is 125, and it is said that this speed will be increased materially if it is necessary to make the time required. It is now expected to launch the Northland on May 3.

Water Tube Boilers and Forced Draft.

Messrs. Howden and Ellis, inventors of the two principal systems of forced draft, were both expected to present papers at the meeting of the Institute of Naval Architects, which opened in London a few days ago, and English journals were inclined to attach considerable importance to what they might have to say, in view of the introduction of water tube boilers into the latest big naval vessels of Great Britain. After years of struggle to bring forced draft into notice, the water tube boiler question comes up at a time when it is admitted by a number of leading ship builders that in connection with the Howden system boilers one-half the weight of those necessary with ordinary draught exert the same horse power. Following closely on the Howden system comes the Ellis & Eaves' induced draught. In combination with the Servo tube the promoters of this system have been able to show a still greater economy, being able to burn something like 40 to 50 pounds of coal per square foot of grate surface, and even this they expect very shortly to improve upon.

Mr. H. J. Cornish, writing from White Lion Court, Cornhill, London, informs the REVIEW that while it is true that the committee of Lloyds Register has decided to enter in the register the names and dimensions of all iron and steel vessels of more than 100 tons engaged on the lakes, such vessels will not be given a rating, the particulars given being the same as is now given for other unclassed vessels. No rules for the construction of lake vessels have been approved by the committee of the register society.

How War Vessels are Prepared for Trial.

AN ADDRESS TO ENGINEERS OF CLEVELAND BY MR. ROBERT W. PECK OF NEW YORK.

Members of the Marine Engineers' Beneficial Association in Cleveland were favored, at their last meeting, with an address by Robert W. Peck, a gentleman who is well known to marine engineers and ship builders in the east, as he has acted in the capacity of superintending engineer on the trial trips of nearly all of the United States cruisers other than those built by the Cramps. Mr. Peck's duties in Cleveland at present are of a similar nature in connection with the preparations for bringing out the Northern Line passenger steamer Northwest. At the same meeting, Mr. G.L.H. Arnold, who is associated with Mr. Miers Coryell in looking after the construction of the Belleville boilers, read the paper on this type of boiler, which was prepared a short time ago by J. A. Courier, engineer of the yacht Wild Duck, and which was printed in the last issue of the REVIEW.

Mr. Peck's paper, or address, was not one of a formal kind. It was more of an interesting talk to the engineers, and pertained mainly to his experience in preparing war vessels for the trials in which premiums or penalties are involved. Stripped of the introduction, which had reference to the nature of contracts for war vessels, and a few other parts dealing with the calling of engineers in general, it is as follows:

"As engineers, the matter which I think most interests you is the management of the engine department of these cruisers while preparing them for trials. The record obtained during these trials whether speed or horse power, goes with the ship, and all of the vessels with which I have had to do when making these trials, can I think, by proper manipulation do the same or even better again, at any time before age or other causes shall have weakened the elements used to make the trials. To be employed by the contractor you must have a reputation as an expert in that particular kind of work, as money is at stake with the builder as well as his reputation. You will understand that although these engines are designed by able men, whose work is as near perfect as they can make it, it does not follow that the work of the machinery will be entirely satisfactory. On this account your knowledge and skill will be wanted. If you meet the requirements you will probably be well remunerated for what you do. If you do well, it generally follows that the contractor is pleased, and that he will not forget to show you that he appreciates the favor you have done him by being the means of replenishing his bank account. The short way to say this is that you must be able to know what to do to make the machine do the most, and to make any changes necessary for such performance. My experience has been that some alterations are necessary in several of the parts before it is possible to get a satisfactory performance, and I have come to the conclusion that this is to be expected. I have found it with engines I have designed myself. I have said that you must be able to make these changes. That it is well for you to be able to do so as an engineer, there can be no doubt, but will the contractor or the owner permit you to do so? It would seem that if he had confidence enough in you to employ you for such an undertaking, he would trust to you to use your own judgment. In my experience I have found that when I came to the turning up of the engine and it was necessary to alter any of the parts, the leading men of the different companies were opposed to anything in the way of an alteration and it was necessary to do considerable talking to gain a point in that direction. This is one of the disagreeable features of such trial trips, but usually by keeping your head level you will get along very well, and before the time for the final wind up, which is the official trial, you will have your machine mostly as you wish to have it. After having come to an understanding with the contractors as to what you are to do and settled all minor questions as completely as possible, you will first obtain a suitable crew of men. A proper selection is absolutely necessary. They must be cool-headed, fearless fellows, and it is particularly desirable that they be not afraid of steam, so long as it does not reach them. I have found some trouble in obtaining suitable men for this kind of work, but the preliminary trial often proves them and they go away.

"Now we are supposed to have gotten aboard the cruiser with assistant engineers, oilers, water tenders and firemen in numbers sufficient to run the machinery for four hours, and then the training begins. The engines and all auxiliary engines and boilers are now supposed to be complete with every appliance in place, oil service and water service ready to receive the oil and water. All instruments are up ready to be used to take data of the performance of different factors that are to combine to obtain an intelligent knowledge of the trial, from which a proper report can be made. First a proper and thorough examination of all parts of the boilers and engines must be made. The grate surface is to be measured correctly as well as the air opening in grate, area of opening into the combustion chambers, area of opening through tubes, area of opening out of uptakes and area of smoke stacks, and the bracing of boilers and position of valves and pipes entering and leaving the boilers must have careful attention. The dry pipes are very important factors and require the closest kind of examination, for it is important that the steam be dry, and with this these pipes have much to do. The separators must have a proper examination,

and the steam traps attached to them must be in the best of order and should be of the best kind. The engines too, are being carefully examined. All bearings are taken apart, cleaned, adjusted and oiled; cylinders are opened and carefully examined, and pistons and their packings are looked over carefully. Valves are taken out, measured, taken apart and cleaned, put back, and careful readings taken of their functions. All piping has to be carefully looked over to see that it is properly run, and that it is provided with slip joints wherever it is necessary, and that it is so run that it will not be subjected to any undue strain, from any cause that in any way probable might occur. All the leading men must make themselves perfectly familiar with all valves about the engine and boilers, and this is not a very small matter, for the number is large, and although they are all marked, time is required to learn them thoroughly and it is important that the right valve is handled at the right time. Having done with the examination, we will proceed to fill the boilers with water. When full we will warm them by starting some fire. Then the testing is to be done. I usually test to at least 50 per cent. more pressure than what I intend to use on the trial. The safety valves are now adjusted to retain a pressure about 20 pounds greater than I wish to use on the trials. All this work, bear in mind, is to be carefully done, for the success of the trial depends very much upon how thorough you have been in getting ready, and it is always well to keep in mind that it is a very small thing that may stop the trial and add to the general cost of getting the cruiser to the final stage of completion.

"We are now far enough advanced to get steam on the boilers and to commence to run the engines. The fires are lighted and allowed to burn slowly, in order that the expansion to the boilers and pipes may be as even as possible. If we have a small boiler, we use it to run pumps for the purpose of circulating the water in the boilers, which is a very good way to overcome the evil effects of unequal expansion. When steam is made of sufficient pressure, the circulating and air pumps are started, the vacuum is obtained and then the main engines are warmed up in a careful manner and started slowly. The cruiser is securely fastened, usually to a wharf. The running of the engines continues day and night, one side at a time. Any work that is required is attended to on the off days for each engine. This is kept up until the wearing surfaces are well smoothed and the adjustment of valves has been perfected. During this time the boilers have all been used with forced draft, but only a part of them at a time. The blowers have been tested and all defects have been attended to. Air pressure, which is an important factor, has been watched very closely. The men have been properly drilled and taught to know and do their respective parts. This usually requires about three or four weeks time and during that time it has been learned very nearly how much coal can be consumed to the square foot of grate and how many cubic feet of steam it will make, and also how much water can be evaporated. The best point of cut-off is established and the piston valves are altered to suit that when in full gear. This applies to the high pressure valves particularly.

"Having done so much, we may consider that it is now time to take the cruiser away for a preliminary trial. This is done to establish the pitch of the screws, and also to have all of the boilers at work at the same time with forced draft on, and with the engines working at full power. This gives the men a chance to understand more fully all that is to be done when the official trial comes. After a short run the cruiser returns to the place where the docking is to be done, and is placed in dock. The bottom is cleaned and prepared for the trial and the screws receive proper attention. When this is over with, the ship is sometimes taken for another preliminary spin and if the results are satisfactory the contractor gives notice to the secretary of the navy that all is ready for trial. The trial board is then ordered to proceed to the proper place and go on with the trial as instructed by the secretary of the navy, a copy of whose instructions are sent to the contractor, informing him as to when and where the trial is to be made. A few days are usually allowed in which to get the cruiser ready. This getting ready consists in loading the ship to the proper draft specified in the contract, putting stores and men on board, coal in the bunkers, and a sufficient quantity of selected coal weighed and put into bags to make the trial. This coal is so placed that it can be conveniently gotten into the fires. The cruiser is then steamed to the harbor most convenient to the place of trial and usually one day is taken in further preparation."

"We are now at our place ready for the orders to go on the trial in the morning. A consultation regarding plans of management is held between captain, pilot and chief engineer. Matters must be so arranged that all will move in perfect harmony. The time of starting and a signal to inform the engineer that the trial is finished are agreed upon between them only. With the representatives of the government aboard, the cruiser weighs anchor and with new fires and a low pressure of steam starts for the course, which it is preferable to have about one hour at half speed away. The start is made to reach the course at the appointed time, so that there shall be no delay. The forced draft is started as soon as the cruiser is well under way, moderately at first. The firing is now kept up at very short intervals until the furnaces are well filled with fire. Nothing but

the lump coal is used and that is the best that can be obtained. When you consider that from 40 to 50 pounds of coal are consumed on a square foot of grate per hour, you will conclude that some work has to be done. It is simply driving to get all the steam you can, which means burn all the coal possible. But while this is going on it is necessary that there shall be no excitement. No loud talking can be allowed—all orders are given by signs or by the use of bells. The men have been thoroughly drilled and know what to do. In case of anything happening, and it is a matter that can be righted, it is done quickly. The men who have been selected for firing are at work with a will. The extra watch is employed to handle the dampers in the air ducts and to open and close the furnace doors. All has been timed so that about ten minutes before the first line of the starting point of the course is reached the cruiser is going at the top of her speed. Members of the trial board are at their respective stations. All of their arrangements have been made the day before, and since the start they have been getting their instruments in their places and at a signal from the deck the engineers begin their separate duties, noting steam pressure, vacuum, reading of revolution counters, revolutions of blowers, air pressure in air ducts, ash pans, uptakes; temperatures of steam, temperature of engine room, fire room, feed-water, condensing water, speed of all auxiliary machinery, indicate pumps both steam and water ends. This is done each fifteen minutes during the trial. The number of engineers for the government on these trials is from twelve to twenty. The steam must be kept steady and the fires burning. No cold air must be allowed to enter the furnace. It is kept out by keeping the blast on strong enough to fill the furnace with gas and flame. The boilers were filled with water as high as they could be with safety on the start. A tank of fresh water placed on the deck has a steam pipe leading into it, and a pipe to draw the water down into the feed water tank when required to replenish the boilers. The steam has been turned into the tank and the water heated to the boiling point. This water is wanted usually during the last hour. Then, too, the steam is wanted in the engines. If all has been rightly planned and you can make the last of the four hours equal to the first, then you have done well. When the last hour is reached, all begin to count the minutes and when the last line has been crossed every one down in the engine room is very much pleased, and in the fire room much more so if possible. If all has been carried out without a hitch or break, smiles are on all faces and congratulations are in order, but the reverse is the case in event of failure. As I have tried to show you that very much depends upon the thoroughness of preparation and the selection of the right men for these trials, in which a performance out of the usual course of engineering is expected, you will readily see that it would not be doing justice to the men engaged in the work to say that it is all play, but so far as I know all of those who go through it like it and will leave almost any place to repeat their experience."

Some Appointments of Masters and Engineers.

Western Transit Company, Buffalo, N. Y.: Steamers—Arabia, Capt. Robert Murray, Engineer Patrick Welch; Badger State, Capt. A. J. McDonald, Engineer James Lee; Boston, Capt. Thomas McCabe, Engineer Dugald Buie; Buffalo, Capt. William McNulty, Engineer Patrick Shea; Chicago, Capt. F. A. Miller, Engineer F. J. McCabe; Commodore, Capt. J. W. Brooks, Engineer R. D. Gardner; Empire State, Capt. G. F. Hale, Engineer John Cassin; Harlem, Capt. M. J. Laney, Engineer Frank Williams; Hudson, Capt. Moses Trouton, Engineer J. H. Dissett; Idaho, Capt. James Anderson, Engineer G. W. Bryce; Milwaukee, Capt. J. W. Rainey, Engineer Michael Folan; Mohawk, Capt. Henry Hess, Engineer Valentine Jones; Montana, Capt. William Tibby, Engineer S. R. Jones; Syracuse, Capt. J. W. Mark, Engineer Donald Gillies; Vanderbilt, Capt. Fred. Hale, Engineer Neil McCormick.

Montreal Transportation Company, Kingston, Ont.: Steamers—Active, Capt. John Gaskin, Engineer _____; Bronson, Capt. Joseph Murray, Engineer R. Hepburn; Glide, Capt. C. Martin, Engineer W. Spencer; Glengarry, Capt. J. N. Mawdesley, Engineer C. McSurley; James A. Walker, Capt. John Boyd, Engineer R. Marshall; D. G. Thomson, Capt. J. Murray, Engineer G. Henderson; Jessie Hall, Capt. J. Martin, Engineer A. Barton; Bannockburn, Capt. A. McMaugh, Engineer H. Thurston. Schooners—Minnedosa, Capt. J. Irwin; Selkirk, Capt. J. Fleming; Winnipeg, Capt. C. Staley; Kildonan, Capt. F. Lafrance; Jennie, Capt. R. Bradley; Regina, no appointment as yet.

Union Steamboat Company, Buffalo, N. Y.: Steamers—Chemung, Capt. Walter Robinson, Engineer Henry C. Jordan; Owego, Capt. John Byrne, Engineer Charles W. Wall; Tioga, Capt. A. A. Phelps, Engineer George Freitsche; H. J. Jewett, Capt. D. O. Bordeaux, Engineer William Skelton Jr.; Rochester, Capt. W. B. Garden, Engineer N. Johnson; New York, Capt. John M. Clossey, Engineer Joseph Howlett.

Ogdensburg Transportation Company, Ogdensburg, N. Y.: Steamers—W. L. Frost, Capt. E. B. Shay, Engineer James Chestnut; W. A. Haskell, Capt. D. Murphy, Engineer A. D. Houghton; W. J. Averill, Capt. W. De Wait, Engineer Harris Higgins; Gov. Smith, Capt. W. S. Shay, Engi-

neer, James Turnbull; J. R. Langdon, Capt. Harvey Brown, Engineer John N. Philips; F. H. Prince, Capt. D. A. Kiah, Engineer D. J. Costello; H. A. James, Capt. James Owens, Engineer Robert Chestnut, Jr.; A. McVittie, Capt. W. H. Williams, Engineer Morris Gore.

Roby Transportation Company, Detroit, Mich.: Steamers—Geo. W. Roby, Capt. John Duddleson, Engineer J. Collins.

Alger, Smith & Co., Detroit, Mich.: Towing steamers—Volunteer, Capt. Thomas Hackett, Engineer P. B. McCabe; Gettysburg, Capt. William H. Rollo, Engineer W. P. Wenner; Torrent, Capt. S. H. Carrie, Engineer J. M. Cronenweth.

Hutchinson, John T., Cleveland, O.: Steamers—Germanic, Capt. J. McNeff, Engineer C. Price; Rube Richards, Capt. M. H. Place, Engineer H. Harris; Queen of the West, Capt. J. De Beau. Schooners—E. C. Hutchinson, Capt. L. G. Vosburgh; May Richards, Capt. T. K. Woodward.

Whitney, D. C., Detroit, Mich.: Steamers—Merida, Capt. W. H. Hutcheson, Engineer James Balfour; Tampa, Capt. John Ivers, Engineer Charles Murrett; Mecosta, Capt. John Leonard, Engineer George Franchombe; Lansing, Capt. C. G. Ennis, Engineer James Coveyeau; D. C. Whitney, Capt. D. Critchet, Engineer Joseph Lacey; Nipigon, Capt. A. C. May, Engineer J. Egan. Schooners—Ashland, Capt. George Dennis; Melbourne, Capt. George Cooper; Wayne, Capt. Benjamin Cole.

Close, G. W., Berlin Heights, O.: Steamer—C. W. Elphicke, Capt. F. C. Rae, Engineer John Smith.

Pennington, B. L., Cleveland, O.: Steamers—C. B. Lockwood, Capt. Richard Jollie, Engineer John B. Millen; George Spencer, Capt. J. B. McManus, Engineer C. W. Stedman. Schooner—B. L. Pennington, Capt. C. W. Lockwood.

Morley, C. T., Marine City, Mich.: Steamers—St. Lawrence, Capt. Ralph Byrns, Engineer S. O. Durrant; J. J. Hill, Capt. John Andrews, Engineer A. A. Cameron.

Goodrich Transportation Company, Chicago, Ill.: Steamers—Virginia, Capt. H. E. Stines, Engineer G. P. Roth; Indiana, Capt. A. Gallagher, Engineer R. Flint; City of Racine, Capt. J. M. Gee, Engineer William Parker; Atlanta, Capt. William Nicholson, Engineer B. Beerman; City of Ludington, Capt. John Raleigh, Engineer John Bushman; Chicago, Capt. George Wittey, Engineer G. Neidert; Muskegon, Capt. Edmund Carns, Engineer T. Dorsey.

Northern Michigan Transportation Company, Chicago, Ill.: Steamers—Petoskey, Capt. W. P. Robertson, Engineer Thomas Collins; City of Charlevoix, Capt. William Finucan, Engineer Fred D. Philps; Puritan, Capt. Peter McGuigan, Engineer James Myers; Lawrence, Capt. Joseph Boyd, Engineer Frank Bowen.

Republic Steamship Company, M. M. Drake, manager, Buffalo, N. Y.: Steamers—Brazil, Capt. Joseph Hulligan, Chief Engineer Albert Edgar; America, Capt. James Gibson, Engineer John H. Haig; Maytham, Capt. A. B. Drake, Engineer Robert J. Close.

Moore, Truman, Lorain, O.: Schooners—Alice B. Norris, Capt. John Robinson; Kate Winslow, Capt. William Duff.

Lackawanna Transportation Company, Buffalo, N. Y.: Steamers—Grand Traverse, Capt. John B. Green, Engineer Edward A. Carter; Russia, Capt. Henry Murphy, Engineer William Brown; Lackawanna, Capt. Frank Weinheimer, Engineer W. B. Lewis; Scranton, Capt. J. H. Green, Engineer Charles Van Avery; Florida, Capt. Henry McAdams, Engineer George M. Wise; Wyoming, Capt. Henry Ferguson, Engineer John Hess; Cuba, Capt. Robert Young, Engineer E. M. Murdock; Arthur Orr, Capt. C. J. Montague, Engineer Thompson Pike; J. W. Moore, Capt. Richard Neville, Engineer Walder.

Detroit and Cleveland Steam Navigation Company, Detroit, Mich.: Steamers—City of Detroit, Capt. Alex. J. McKay, Engineer William S. Huff; City of Cleveland, Capt. Dugald McLachlan, Engineer John Sargent; City of Alpena, Capt. Matthew Lightbody, Engineer John Jones; City of Mackinac, Capt. H. J. Slyfield, Engineer William McDonald; City of the Straits, Capt. Duncan McLachlan, Engineer James Middleton.

Owen, J. Emory Transportation Company, Detroit, Mich.: Steamers—John Owen, Capt. E. F. Thorpe, Engineer S. L. Phillips; J. Emory Owen, Capt. J. P. Young, Engineer M. Delaney. Schooner—Michigan, Capt. F. J. Cadotte.

Corrigan, John, Cleveland, O.: Steamer—Aurora, Capt. Robert Donaldson, Engineer, Christopher Castle. Schooners—Adams, Capt. Andrew McKay; J. I. Case, Capt. William F. Hormig.

Cleveland and Buffalo Transit Company, Cleveland, O.: Steamers—State of Ohio, Capt. John Edwards, Engineer J. G. Randall; State of New York, Capt. William H. Smith, Engineer Robert Stage.

Minnesota Steamship Company, Cleveland, O.: Steamers—Mariposa, Capt. G. B. Mallory, Engineer Alonzo Arnold; Maritana, Capt. F. D. Root, Engineer George Waterbury; Masaba, Capt. J. P. Cottrell, Engineer George Arnold; Marina, Capt. Andrew Graves, Engineer S. H. Miller;

Manola, Capt. C. H. Bassett, Engineer Malcolm Jamieson; Mariska, Capt. Alex. McFarland, Engineer R. L. Peck; Maruba, Capt. Fred. Hoffman, Engineer B. F. McCanna; Matoa, Capt. F. A. Graves, Engineer A. R. Brooker.

Corrigan, James, Cleveland, O.: Steamers—Australasia, Capt. J. W. Morgan; Bulgaria, Capt. A. H. Gain; Caledonia, Capt. R. J. Lyon; Italia, Capt. C. H. Cummings. Schooner—Northwest, Capt. Lewis Leonard.

Brown Steamship Company, Cleveland, O.: Steamer—Castalia, Capt. C. C. Allen, Engineer James Hay.

Northwestern Transportation Company, Detroit, Mich.: Steamers—Harvey H. Brown, Capt. E. C. Gatfield, Engineer James H. Hand; S. R. Kirby, Capt. James Fraser, Engineer William Watts; Fayette Brown, Capt. David Girardin, Engineer Nicholas Anderson; E. M. Peck, Capt. C. H. Chamberlain, Engineer J. H. Foster.

Vulcan Transportation Company, Detroit, Mich.: Steamers—Forest City, Capt. Joseph Sanders, Engineer William Harling; R. J. Hackett, Capt. Henry Sanders, Engineer Thomas Harding. Schooners—H. H. Brown, Capt. E. M. Fuller; McGregor, Capt. Joseph B. Hochrath.

Dulac, Wm., Mt. Clemens, Mich.: Steamers—F. R. Buell, Capt. C. W. Woodgrift, Engineer C. F. Lamb; A. Weston, Capt. M. Hyde, Engineer John Hibberd; Canisteo, Capt. W. J. Lynn, Engineer C. S. Peltier; Norwalk, Capt. J. S. Ruby, Engineer ———; Chas. A. Street, Capt. A. P. Gallino, Engineer ———. Schooners—A. Stewart, Capt. Geo. Pollock; Eleanor, Capt. Frank Duboy; Jennette, Capt. Ed Moore; Elvina, Capt. Wm. Campau; Fulton, Capt. Frank Laforge; J. B. Lozen, Capt. John B. Lozen; S. B. Pomeroy, Capt. Jas. O. Robertson.

Livingstone, W. A., Detroit, Mich.: Steamers—Livingstone, Capt. W. H. Wilson, Engineer Alex. Morison; T. W. Palmer, Capt. Geo. F. Stilphen, Engineer Robt. B. Hodge.

Jackson, G. K., Bay City, Mich.: Steamers—D. Leuty, Capt. D. Morrison, Engineer ———; Burlington, Capt. S. M. Powrie, Engineer ———. Schooners—Celtic, Capt. John Lovell; R. Bottsford, Capt. C. K. Jackson; G. K. Jackson, Capt. Curtis Jackson.

Shores Lumber Company, Chicago, Ill., and Ashland, Wis.: Steamers—Jas. H. Prentice, Capt. Jas. J. Carr, Engineer ——— O'Hara; Geo. W. Johnson, Capt. Jas. Comstock, Engineer M. Mahr. Schooners—Middlesex, Capt. P. T. Weimar; Halstead, Capt. L. Davidson; Constitution, Capt. L. Johnson.

West Division Steamship Company, W. H. Wolf, manager, Milwaukee, Wis.: Steamers—Fred Pabst, Capt. W. Lund, Engineer J. Bennett; W. H. Wolf, Capt. D. Sullivan, Engineer T. Albrighton.

Holland, Nelson, Buffalo, N. Y.: Steamer—C. F. Curtis, Capt. Jas. Cunningham. Schooner—Isabel Reed, Capt. Peter Johnson; T. S. Fassett, Capt. Albert Renders; N. C. Holland, Capt. Peter Keischgens.

M. J. Cummings, Oswego, N. Y.: Steamers—Chas. S. Parnell, Capt. Griffin, Engineer ———; Monteagle, Capt. Wm. Griffin, Engineer F. E. Wheeler.

McGraw Transportation Company, Edward Smith, manager, Buffalo, N. Y.: Steamers—City of Venice, Capt. F. P. Houghton; City of Paris, Capt. E. D. Ballantine, Engineer J. McLaughlin; Thomas Cranage, Capt. John S. McNeil, Engineer W. H. Brown.

Smith, Edward, Buffalo, N. Y.: Steamers—Sam'l. Marshall, Capt. Jas. T. Kinney, Engineer A. Leach; Samoa, Capt. W. W. Stewart, Engineer Lewis Minnie.

Graham & Morton Transportation Company, Chicago, Ill.: Steamers—City of Chicago, Capt. Wm. McIntosh, Engineer Wm. McClure; Chicora, Capt. Ed Stines, Engineer Robt. McClure; R. C. Reid, Capt. J. Griffin, Engineer ———.

Lake Erie Transportation Company, Toledo, O.: Steamers—Geo. J. Gould, Capt. Walter Cottrell, Engineer Geo. Butler; S. C. Reynolds, Capt. Henry Roch, Engineer J. H. Miller; Russell Sage, Capt. Cooper Herrick, Engineer J. H. Kohlbrenner; Jno. C. Gault, Capt. J. H. Lewis, Engineer Jas. C. Benstead.

Elphicke, C. W. & Co., Chicago, Ill.: Steamers—Arthur Orr, Capt. C. Z. Montague; Ohio, Capt. John Isbister; Josephine, Capt. John Massey. Schooners—T. L. Parker, Capt. Jas. Langan; Gifford, Capt. E. J. Kohnert; C. P. Minch, Capt. Ed Myers; Cheney Ames, Capt. Thos. Myers.

Moore, John W., Cleveland, O.: Steamers—J. W. Moore, Capt. Richard Neville, Engineer Walder; Louisiana, Capt. John Colter, Engineer Stone; James Pickands, Capt. J. C. Beach, Engineer Elmer Ennis; Marquette, Capt. Edward Chilson, Engineer H. T. McAuley; Colonial, Capt. J. H. Stover, Engineer Masters.

Mutual Transportation Company, Cleveland, O.: Steamers—Cambria, Capt. S. Murphy, Engineer John Mayberry; Corsica, Capt. Wm. Cumming, Engineer Wm. Steen; Corona, Capt. John Dunn, Engineer A. L. Wilcox.

Wilson Transit Company, Cleveland, O.: Steamers—Yuma, Capt. A. C. Chapman, Engineer John Kelley; Spokane, Capt. B. H. Jones, Engineer

James Derrig; Yakima, Capt. W. W. Dawley, Engineer John Costello; Missoula, Capt. William A. Williams, Engineer Peter Lamar; Wallula, Capt. C. A. Benham, Engineer James McGuirk; Sitka, Capt. Dan Buie, Engineer Martin McCune; Olympia, Capt. A. M. Sheppard, Engineer Fred Harmon; C. Tower, Jr., Capt. W. T. Southerland, Engineer Charles Ogg. Schooners—Yukon, Capt. William Forbes; Wadena, Capt. C. H. Daniels.

Wallace, David, Lorain, O.: Steamers—Vega, Capt. F. H. Brown, Engineer Charles Sterling; Vulcan, Capt. W. H. Wallace, Engineer John McMonagle; Robert Wallace, Capt. A. Oldorff, Engineer Edward Stoddard. Schooner—David Wallace, Capt. Alex. Porter.

Menominee Transit Company, Cleveland, O.: Steamers—Norman, Capt. S. Stratton, Engineer Clement Clark; Saxon, Capt. William C. Goodsell, Engineer Geo. E. Avrill; German, Capt. F. W. Stenton, Engineer Geo. W. Curtis; Briton, Capt. ———, Engineer O. H. Gillmore; Grecian, Capt. J. W. Walsh, Engineer T. J. Rees; Roman, Capt. A. J. Greenlee, Engineer S. A. Wells.

Edgar, John T., Saginaw, E. S., Mich.: Steamers—C. H. Green, Capt. John C. Garey, Engineer Charles Allby; Oscoda, Capt. George W. Ryan. Schooners—Our Son, Capt. William A. Edgar; Genoa, Capt. D. C. Ryan; C. G. King, Capt. Peter Edgar; A. C. Keating, Capt. Patrick Ryan; Ida Corning, Capt. Peter H. Edgar.

Fitzgerald, R. P. & Co., Milwaukee, Wis.: Steamers—Philip D. Armour, Capt. F. D. Chamberlin, Engineer J. R. Mason; Wiley M. Egan, Capt. Fred. C. Howe, Engineer John McCaffery; R. P. Fitzgerald, Capt. Leslie E. Boyce, Engineer M. B. McNeil; John Plankinton, Capt. Lewis H. Powell, Engineer William Fell; Denver, Capt. Peter Christenson, Engineer John Smith; Omaha, Capt. Duncan Stalker, Engineer Alex. Staley; Pueblo, Capt. M. Fitzgerald, Engineer James Reagan; Topeka, Capt. Albert Gibbs, Engineer John Cantwill.

Marine Transit Company, Marine City, Mich.: Steamers—Toltec, Capt. James Taylor, Engineer Charles Pierce; Aztec, Capt. James W. Baby, Engineer Amos Horton. Schooners—Miztec, Capt. H. S. Shackett; Zapotec, Capt. Peter Thompson.

Flint & Pere Marquette Railroad Company, Ludington, Mich.: Steamers—No. 1, Capt. M. McRae, Engineer H. DeClute; No. 2, Capt. Jas. Mooney, Engineer E. S. Heinline; No. 3, Capt. John Stewart, Engineer Robt. McLaren; No. 4, Capt. Jos. Russell, Engineer F. McLaren; No. 5, Capt. Chas. Moody, Engineer Chas. Wilcox.

Recor, E. C., St. Clair, Mich.: Steamers—Mark Hopkins, Capt. S. A. Lyons, Engineer S. G. Merrill; F. W. Fletcher, Capt. H. Moore, Engineer William Brake. Schooner—Porter, Capt. McDonald.

Hall, George, Coal Company, Ogdensburg, N. Y.: Steamer—Hecla, Capt. D. Hourigan, Engineer D. Doyle. Tugs—W. L. Proctor, Capt. W. A. Russell, Engineer A. E. Cline; Thos. Wilson, Capt. J. P. Richard, Engineer R. J. Jardin; Curlew, Capt. P. J. McGrath, Engineer G. M. Cline. Schooners—W. A. Sherman, Capt. C. W. Howard; Bolivia, Capt. Joseph Gooden; Beals, Capt. George Cote; Mary Lyon, Capt. S. La Flain; Fannie Mathews, Capt. F. D. Sum. Barges—Argosy, Capt. John Gokey; Diamond, Capt. A. Rabideau; Mohawk, Capt. N. Bennett, Sr.; Onondaga, N. Bennett, Jr.

Trade Notes.

The Sheriffs Manufacturing Company has furnished two steam steerers to tugs of the Inman fleet at Duluth; a wheel to a tug at New Orleans, La.; one to a tug at Cairo, Ill.; one to a tug at Montague, Mich.; one to a tug at St. Joseph, Mich., and one to the steamer W. H. Barnum.

Messrs. Arnold C. Saunders and Harold B. Nye announce that they have become associated in the coal, iron ore and pig iron commission business, under the name of A. C. Saunders & Co., with offices at 507 and 508 Western Reserve building, Cleveland, O. The firm of Mack, Nye & Co. was dissolved a short time ago.

S. F. Hodge & Co. of Detroit are putting the machinery into the new steambarge, built last winter at Marine City for Curtis & Brainard of Toledo. A new steambarge for the Sicken Steambarge Company of Marine City is nearly completed at Morley's yard. The machinery for this boat is also being furnished by S. F. Hodge & Co.

The receivership of Corrigan, Ives & Co., Cleveland dealers in iron ore, has come to an end and the firm has been reorganized under the name of Corrigan, McKinney & Co. Mr. Ives retires, and Mr. Price McKinney, who was previously connected with the firm as a representative of Judge Stevenson Burke's interests, and who was later appointed receiver, has become one of the principal partners.

If the Boston Tow Boat Company succeeds in releasing the wreck of the Kearsarge from Roncador reef the navy department will pay \$34,000 for the work, and \$8,500 is to be paid in event of failure for a reasonable effort to save the wreck. One of the American Ship Windlass Company's patent towing machines is used on the wrecking steamer that has taken the expedition to Central America.

Opposed to the Tracey Bill.

Ship builders on the lakes recently received from E. C. O'Brien, United States commissioner of navigation, letters asking for an expression of opinion from them on the Tracey bill, which proposes a general application of the law under which the American line steamers Paris and New York were registered in this country. The answer of Mr. W. I. Babcock of the Chicago Ship Building Company, a copy of which follows, is especially interesting:

Hon. Eugene T. Chamberlain, Commissioner of Navigation,
Treasury Department, Washington, D. C.:

SIR:—Your circular inquiry of the 26th ult., asking for opinions concerning the bill H. R. 5857, commonly known as the Tracey bill, now before congress, and especially requesting reply to certain specific questions, is received and carefully noted, and we beg to say:

First—To your first question, as to whether the principle of the act of May 10, 1892, should be made general, we answer that as we have never been in favor of that act itself we are most decidedly opposed to its extension to include all citizens and vessels as proposed in the present bill. We regarded at the time and still regard the act of May 10, 1892, as the thin end of the free ship wedge, an end long drawn out and apparently very far off from the blunt head, but most cunningly devised to be driven home by comparatively few blows to rend the ship building industry of this country asunder. It does not take a ship carpenter to understand that the longer and thinner the wedge the easier it is driven. The act of May 10, 1892, admitted to American registry the steamers City of Paris and City of New York, two of the highest class ships of the world, and it is safe to say that, at that time, no such bill could have been passed if the vessels proposed to be so admitted had been of ordinary types, sizes and speeds. The apparent advantages of our becoming immediately possessed of two such ships, with the resultant building of two more of equal high class—not the least of which is the practical augmentation of the navy by the provision for the use of these vessels as armed cruisers when required, without expense to the government for the first cost or maintenance in time of peace—as well as the purely sentimental desire, however patriotic it may be, that all of us have to see our flag waving over vessels equal in all respects to any in the world, blinded most of us to the real significance of the act. The bill went through with a rush and President Harrison himself raised the starry flag on the Paris, while the eagle screamed, the newspapers gushed, champagne and tears of joy mingled until the scuppers overflowed, and everybody hugged his neighbor and drank confusion to John Bull over his loss of two such magnificent auxiliary cruisers, without realizing that that astute individual can build plenty more and had at last succeeded in his long struggle to get his ships into this country free—to some extent at least. Now we have the second blow on the wedge in the Tracey bill, which would drive it a long ways toward home. Again we have the saving clause. "Such vessel shall not be employed in the coast wise trade of the United States, or in the trade on lakes or rivers within the United States or on the great lakes." But how long does any sane man suppose that restriction will be maintained, and when it is swept away, the next step, to absolute free ships, will be easy, and will destroy the American industry of ship building.

Second—In answer to your second question, as to whether this measure would stimulate domestic ship building, we would say that while possibly such might be its first result, in the long run the effect for the reasons given above, could be only disastrous in the highest degree. The provision that equal tonnage shall be constructed in this country to all bought abroad is skilfully inserted to forestall objection to the bill by the promise of immediate benefits—truly it is the mess of pottage for which the American ship builder is invited to sell his birthright. The object once accomplished of having foreign built ships admitted to American registry, how long would owners stand the additional expense of building half their ships in this country? Only so long as it would take to get another bill through congress removing all restrictions of any kind. While we do not propose here to discuss the question of free ships itself, it is of course unnecessary to say we are opposed to the theory, and as we think this Tracey bill is a long step in that direction and will inevitably lead to an out and out free ship bill in the near future, we are, in the strongest possible manner opposed to it also.

CHICAGO SHIP BUILDING COMPANY,
South Chicago, Ill., March 8, 1894. W. I. Babcock, Manager.

About 1000 men were engaged on the work of overhauling the American Line steamer New York at the plant of the Newport News Ship Building & Dry Dock Company. The job was completed in seventeen days. Drawing 22 feet of water light, the New York was easily run into the dock. It could have held her drawing a couple more feet of water, while 40 feet could have been added to her length in the dock.

CORRECTED CHARTS OF THE ST. MARY'S RIVER CAN BE HAD FROM
THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, O.

Around the Lakes.

Victor Barney of Detroit has bought from H. W. Baker of Racine the schooner Kewaunee for \$4,000.

Neat models of the Vulcan and Tyzack triple grip anchors, both of the stockless type, can be seen in the office of the REVIEW.

The steamer Nyack has been purchased by Milwaukee parties and she will run between that place and Muskegon the coming season.

Edward Hannan, superintendent of public works in New York state, says he can not have navigation open on the Erie canal before May 1.

John Stang of Lorain has been awarded the contract for building 700 feet of the new dock for the Pittsburg, Shenango & Lake Erie at Conneaut.

Capt. Bernard Wilds purchased the steamer St. Paul at marshal's sale in Detroit on Wednesday for \$9,250. She was valued in the Inland Lloyds last season at \$38,000.

The steamer Rugee has been chartered by the Ogdensburg Transportation Company, and it is more than probable that the Denver and Pueblo will run in the same line.

Capt. Preston is getting ready to build at Ludington, Mich., a small steamer for the excursion business at Chicago. The craft will have 104 feet keel, 21 feet beam and 7½ feet hold.

Mr. A. L. Evans, agent of the Western Transit Company at Minneapolis, announces that J. B. Metz has been appointed traveling freight agent of the company with headquarters at Minneapolis.

Brown & Co. of Buffalo say that hard coal shipments will be lighter than last season on account of stocks carried over at western ports, and shippers will not care to move much coal before May at the earliest.

Another foolhardy sailor, Adolph Frietsch of Milwaukee, is talking of crossing the Atlantic in a small boat. He built a 40-foot sail boat last summer and says he will leave with it in April for Stockholm, Sweden.

Six more vessels of the turret type are to be built at once by Wm. Doxford & Sons of Sunderland, England, who, like the American Steel Barge Company in this country, hold patents on this special form of vessel.

Capt. Alex. McDougall was in Cleveland Monday on his way home from the east. He says the barge company will undertake no new work at present and is not hurrying the completion of the one boat under construction.

The tug business of the firm of L. P. & J. A. Smith of Cleveland has been incorporated under the name of the L. P. & J. A. Smith Company, the capital of the corporation being placed at \$200,000. The new concern will do harbor towing.

The big steel freight steamer being constructed at South Chicago will probably be managed in the office of Pickands, Mather & Co., Cleveland. Work on her is being hurried. She will have gangways and appliances for handling package freight.

As a result of his appointment to the position of wrecking master for C. A. MacDonald & Co., Capt. Cyrus Sinclair has resigned from the local board of steamboat inspectors at Chicago and will also be out of the contest to succeed Supervising Inspector Westcott of Detroit.

Manager Ricketson of the Inter-Ocean Transportation Company of Milwaukee finally admits that he has 150,000 tons of Pewabic ore to carry from Escanaba to Ohio ports. The steamers Maryland and Manchester will be engaged exclusively on the contract, taking no up loads.

Capt. B. B. Inman of Duluth, who has purchased the steamer Belle Cross and barges from Hawgood & Avery of Cleveland, expects to find business for them through his relations with lumber dealers at the head of Lake Superior and also in carrying his own coal from Ohio ports.

The light-house board gives notice that on the opening of navigation, the fourth-order light at Waugoshance light-station, on the northwest end of Waugoshance shoal, will be changed from a fixed white light, varied by a white flash every 90 seconds, to a fixed white light, varied by a white flash every 45 seconds. The order of the light will not be changed.

Breyman Bros. of Toledo have let part of their dredging contract (600,000 yards) on the 20-foot channel work at Grosse point to C. H. Starke & Co. of Milwaukee and Knapp & Dixon of Racine. L. P. & J. A. Smith have also given out a part of their work on the Bar point section. The Sheboygan Dredging and Docking Company will dig 350,000 yards for them at 18 cents. The price at which the Grosse point work is sublet is reported as 12½ cents.

Detroit vessel owners who have protested against exorbitant city taxes have been defeated in another stage of the legal proceedings in which several companies were involved. It is held that according to the ruling of the supreme court of Michigan the term "for business," referring to the general offices of corporations, can not be limited to so narrow a construction as to say that it means simply the annual meeting of the stockholders or the board of directors.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 516 Perry-Payne building, Cleveland, O. Chicago office, (branch), No. 726 Phoenix building.

SUBSCRIPTION—\$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

The books of the United States treasury department contain the names of 3,761 vessels, of 1,261,067.22 gross tons register in the lake trade. The lakes have more steam vessels of 1,000 to 2,500 tons than the combined ownership of this class of vessels in all other sections of the country. The number of steam vessels of 1,000 to 2,500 tons on the lakes on June 30, 1893, was 318 and their aggregate gross tonnage 525,778.57; in all other parts of the country the number of this class of vessels was, on the same date, 211 and their gross tonnage 314,016.65. The classification of the entire lake fleet on June 30, 1893, was as follows:

Class.	Number.	Gross.
Steam vessels	1,731	828,702.29
Sailing vessels	1,205	317,789.37
Canal boats	743	76,843.57
Barges	82	37,731.99
Total	3,761	1,261,067.22

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Net Tonnage.
1889	225	107,080.30
1890	218	108,515.00
1891	204	111,856.45
1892	169	45,168.98
1893	175	99,271.24
Total	991	471,891.97

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

	St. Mary's Falls Canal.			Suez Canal.		
	1892.	1891.	1890.	1892.	1891.	1890.
No. vessel passages	12,580	10,191	10,557	3,559	4,207	3,389
Ton'ge, net regist'd	10,647,203	8,400,685	8,454,435	7,712,028	8,698,777	6,890,014
Days of navigation..	223	225	228	365	365	365

Entered at Cleveland Post Office as Second-class Mail Matter.

A WRITER in the current issue of the Nautical Magazine (London) writes very interestingly of the necessity of a nation keeping her merchant ships under her own flag in time of war. He argues that the war of the rebellion in this country had much to do with the depression in shipping that has since existed, for the reason that at the outbreak of the war, sooner than pay the very slightly advanced war premium, owners transferred their vessels wholesale, mainly to the British flag as represented in the colonies of North America. "If the same thing happens here," he says, "it is little use increasing our navy to protect a commerce which will from natural causes have ceased to exist. As long as we keep the ships, we can command the trade. It is a vital matter, and power should be given to Her Majesty to close the register of British shipping at any time that it might be considered expedient so to do, and on this being done, to make any collusive sale of a British vessel a highly penal offence. We should learn as a nation from the object lessons Providence has vouchsafed us, that without seamen we can not keep the sea and that without merchant ships we shall have lost all that is worth keeping."

W. C. BAXTER and W. C. Porter of Minneapolis, L. F. Lukens of Milwaukee, C. A. Towne of Duluth, E. G. Amot of Brooklyn and D. F. Henry of Detroit have petitioned the Canadian parliament for incorporation of the St. Clair and Erie Ship Canal Company. Who knows of any of these names being connected with a business enterprise of importance in any of the lake cities given as their place of residence? And yet they would appear as the promoters of a project rivaling the proposed Nicaragua canal, while the newspapers go on giving space to their worthless claims. Where do the advocates of such schemes find any return for the time and money spent in their continual useless efforts with legislative bodies? Surely they can not hope in these enlightened times to gull anyone into taking the stock of companies that might be organized through such charters.

IN A recent report to the national officers of the Seaman's Union, Secretary Elderkin of Chicago claims that the membership on the lakes is being quietly increased, but he says that the wage question will not be touched until organization is more complete. There are some men in the

vessel business—and they are not alarmists—who are of the opinion that labor troubles will be quite general during the coming summer. Any difficulties of this kind would result to the disadvantage of vessels having season contracts for the carriage of freight, but a strike that would result in laying up of a large amount of tonnage would not be an unwelcome occurrence to most vessel owners, if it is free of bloodshed or destruction of property. Enforced idleness in any form would tend to create improved freights.

IN ALL the talk of low lake freights and poor prospects for the coming season, it may be well for owners to bear in mind that this is a great big country and that reaction following depression in the lake business in past has always been of a rapid and decided kind. In an article printed in THE REVIEW of March 1, one of the best-posted men in the iron ore business in Cleveland points to the fact that the production of ore in the Lake Superior region prior to 1878 amounted to 10,426,842 tons, while since that time the output has reached the enormous total of nearly 69,000,000 tons. The demand for iron and steel, which is characterized as the crowning glory of the present century, must soon assert itself in a way that will be felt in the ore business.

UP TO 1890, the appropriations for river and harbor improvements on Mississippi and Missouri rivers amounted to \$76,000,000 in addition to \$20,000,000 and over for the Gulf states. The civil sundry appropriation bill, now under consideration in congress, gives about \$8,000,000 more to a half-dozen principal river and harbor items, and of this sum these same rivers get the lion's share, while the long list of aids to navigation authorized by law for the lakes is cut down to eight or ten items involving an expenditure of only a few thousand dollars. Officers of the Lake Carriers Association will not be doing their full duty if they do not insist upon amendments in the senate that will increase the number of lights and fog signals for the lakes to be carried by this bill.

IN ANOTHER part of this issue there is printed a copy of a letter from W. I. Babcock of the Chicago Ship Building Company to E. T. Chamberlain, United States commissioner of navigation, on the subject of legislation which proposes to give general application to the law under which the steamer Paris and New York were admitted to American register. Mr. Babcock is a forcible writer and his letter will prove especially interesting to lake ship builders, who are all understood to agree with him that the act Americanizing the Paris and New York was an entering wedge in the movement for free ships.

IN GREAT BRITAIN the life saving service is divided into two separate and distinct parts. The life boat stations are conducted by a voluntary service, which is at times starved from want of subscriptions, while the rocket apparatus for shore service is maintained by the government. Profiting by the example of superior achievements on the part of the life saving service in this country, a movement in England to abolish the voluntary service and have the government take charge of the entire work is gaining strength.

That Steering Gear.

Editor MARINE REVIEW.—I notice in your valuable paper of the 8th inst. a cut of a steering gear, and in regard to this gear I beg leave to state that it was designed and patented in 1888 by the undersigned. The gear I first designed while in the employ of the Wm. Cramp & Sons Company, for the United States cruiser Baltimore, and it was adopted for the cruisers Baltimore, Philadelphia, New York, Columbia, Minneapolis, Massachusetts, Indiana, Texas, Raleigh and Cincinnati, and also for one of the new steamers under construction for the new American line. The gear, as I understand, has given entire satisfaction. The engines used in connection with it are of the celebrated Williamson Bros. type.

H. KONITZKY, Supt. Marine Dept., Neafie & Levy. Philadelphia, Pa., March 12, 1893.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on March 17, 1894:

	Wheat, bu.	Corn, bu.
Chicago	20,528,000	5,726,000
Duluth	10,092,000	250,000
Milwaukee	882,000
Detroit	1,847,000	35,000
Toledo	3,098,000	1,309,000
Buffalo	1,340,000	430,000
Total	37,787,000	7,750,000

At the points named there is a net decrease for the week of 178,000 bushels of wheat and a net increase of 272,000 bushels of corn.

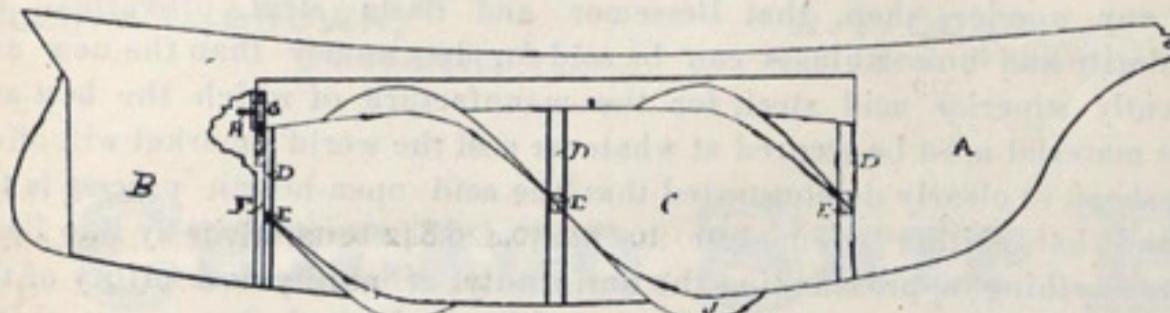
Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

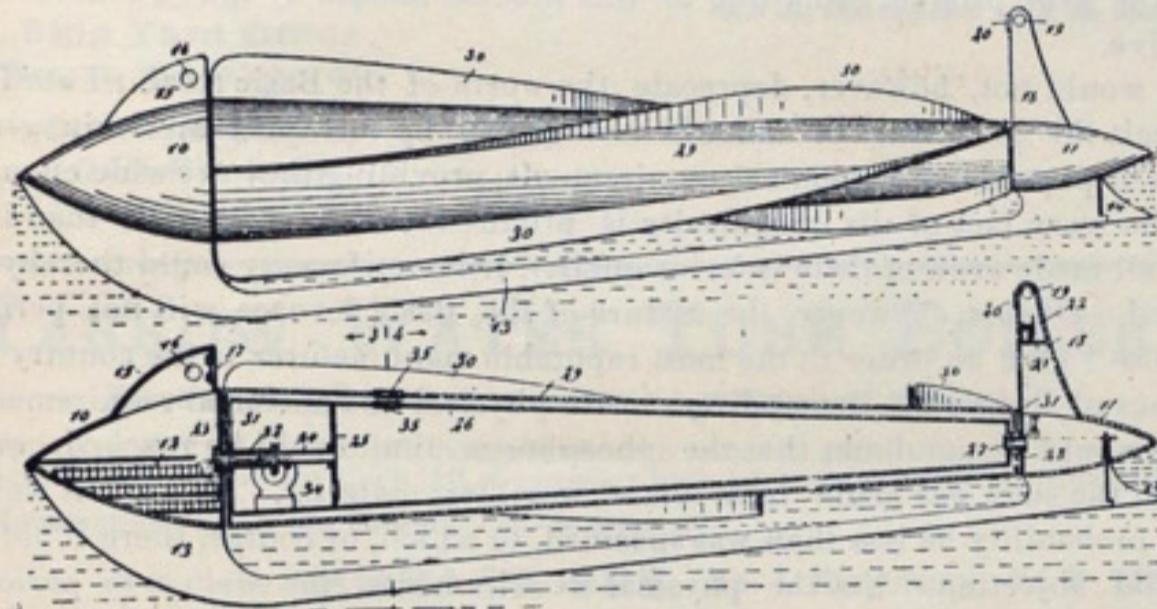
516,261. MARINE PROPELLER. Amos H. Carpenter, Stockton, Cal. Filed April 5, 1893. Serial No. 469,187. (No model.)

Claim.—First, a vessel's hull composed of the bow portion A, the stern portion B, a cylindrical water-tight compartment C, rigidly attached at its respective ends to the bow and stern portions and provided at its

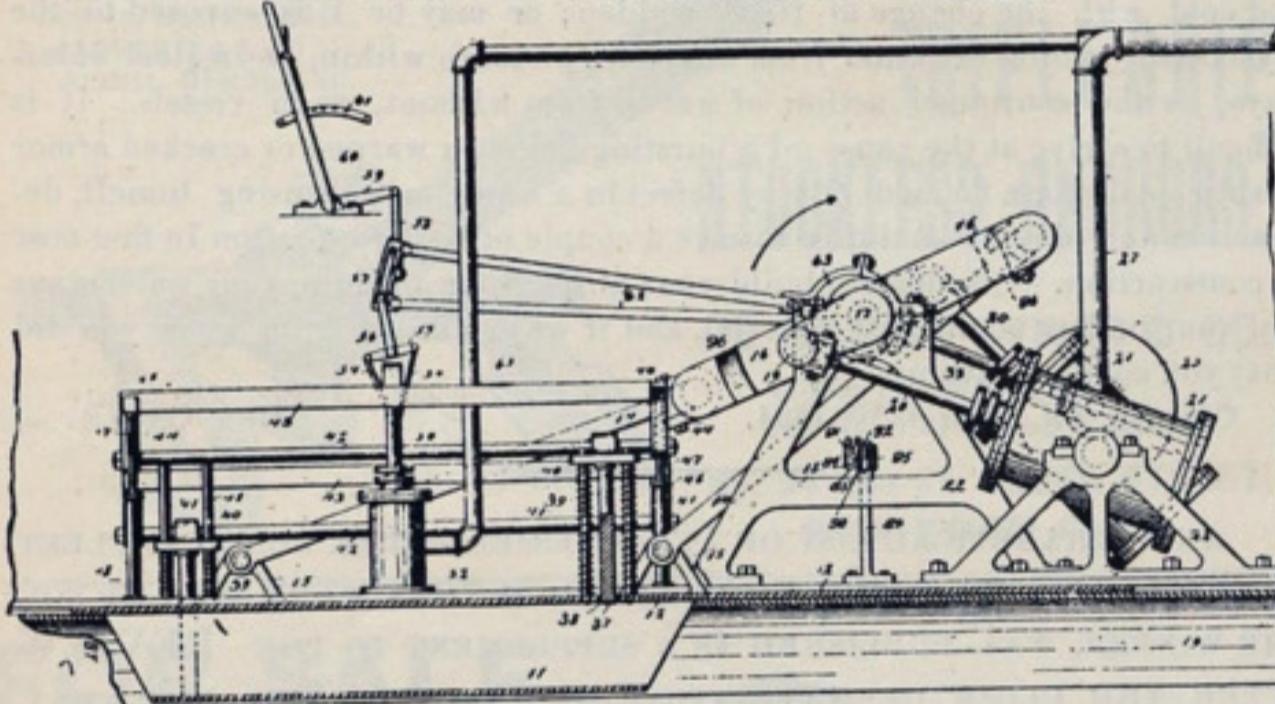
516,261. MARINE PROPELLER



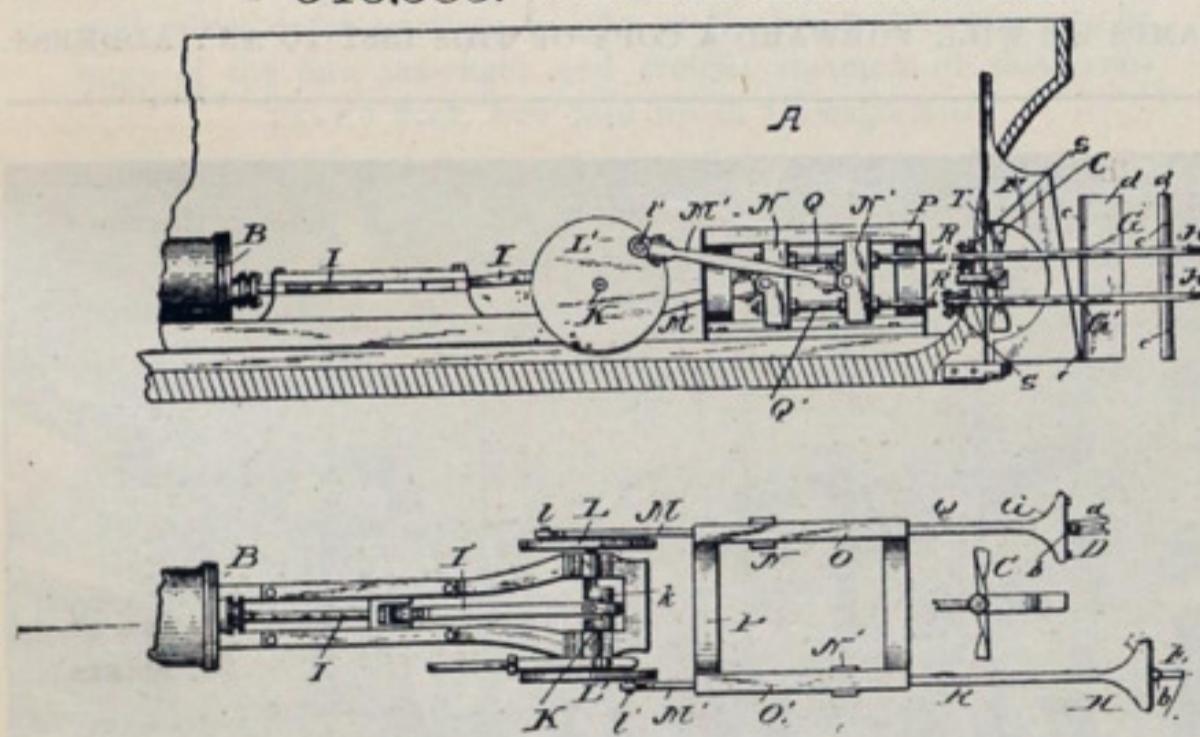
516,395. MARINE VESSEL



516,419. MEANS FOR THE PROPULSION OF VESSELS.



516,535. RECIPROCATING PROPELLER FOR VESSELS



periphery with revolving collars, longitudinal spiral propeller flanges attached to such collars, and suitable machinery for operating such collars and attached flanges. Second, in a marine vessel, the combination with the hull A, B, C, of the revolving collars D, the plates E, the exterior longitudinal spiral propeller flanges J, the cogwheel F, the pinion G, and the shaft H, provided with suitable driving machinery.

516,395. MARINE VESSEL. Sebastien Lacavalerie, Caracas, Venezuela. Filed April 26, 1893. Serial No. 471,849. (No model.)

Claim.—A marine vessel, comprising conical bow and stern portions

having upwardly-extending parts or housings with suitable ports therein, a depressed keel connecting the bow and stern portions of the vessel, a stationary body suspended between these bow and stern portions, hollow shafts connecting the conical parts of the vessel with the body and forming the supports of the body, and a revolvable screw shell incasing the body and journaled on the shafts.

516,419. MEANS FOR THE PROPULSION OF VESSELS. William H. Witte, Long Island N. Y. Filed March 25, 1893. Serial No. 467,583. (No model.)

Claim.—The combination, with the hull of a vessel, and the open ended pipe thereon, of the reciprocating slide plate to move opposite the inner side of the pipe and the piston carried with the slide plate and held to move through the pipe and also adapted to move into and out of the pipe, oppositely arranged magnets provided with armatures adapted to move the piston into and out of the pipe, conducting tracks arranged parallel with the slide plate, conductors carried by the slide plate and adapted to engage the tracks, electrical connections between the conductors and the magnets, electrical connections to supply electricity to the tracks, and mechanism for reversing the current through the magnets.

516,535. RECIPROCATING PROPELLER FOR VESSELS. William K. Hogan, Bradford, Pa. Filed April 24, 1893. Serial No. 471,688. (No model.)

Claim.—In combination with the cranked drive shaft, the drive disks or wheels, the pitmen, the reciprocating cross heads, the sliding propeller shafts having the heads or bearings at their projecting outer ends, the buffers, having enlarged heads, seated in recesses in said heads or bearings, the coiled springs located in said recesses and the hinged propeller blades, all constructed and combined to operate.

Notes and Queries.

CONDUCTED BY GEO. C. SHEPARD.

MARINE REVIEW: What is meant by indicated thrust, and how is size of thrust bearing figured?

Buffalo, N. Y., March 17, 1894.

X.

Indicated thrust is a measure of the pressure against the water exerted by the wheel if the losses in the engine, shaft and screw are eliminated, and is consequently the pressure against the thrust bearing under the same conditions. It is found by multiplying the I. H. P. by 33,000 and dividing the product by the pitch multiplied by the revolutions of the screw. It is used in analyses of the performance of the engine and screw but it is not a correct estimate of the thrust, since the losses between the indicator and screw are always present and are sometimes considerable. The actual energy required to drive a ship through the water is measured by the product of the pressure on thrust block and the speed of the vessel in feet per minute, and is the actual power delivered at the screw, say two-thirds of the I. H. P. Then $I. H. P. \times 22,000 = P \times \text{Velocity}$, and if $M = \text{miles per hour}$ $V = M \frac{5280}{60}$ and $P = I. H. P. \frac{231}{K}$ —pounds pressure on thrust block. Now 60 pounds per sq. in on the thrust block is as much as will run cool, and the surface of rings on shaft must be such that the pressure will not exceed that. If $D = \text{diameter of rings}$, $d = \text{diameter of shaft}$ and $n = \text{number of rings}$; then $P = 47 (D^2 d^2) n$ from which $D = \sqrt{\frac{P}{47n}} - d^2$.

A formula for the indicated horse power of an engine that is easy to remember is this: $I. H. P. = \frac{PLAN}{33,000}$, in which $P = \text{the mean effective pressure per square inch}$, $L = \text{twice the length of stroke in feet}$, $A = \text{the area of piston in square inches}$, and $N = \text{the number of revolutions per minute}$. In this formula the M. E. P. and the number of revolutions per minute are variable, but for each engine $\frac{L A}{33,000}$ is constant and can be reduced to a decimal, by which, if the M. E. P. and revolutions per minute are multiplied as found, the operation of finding the indicated horse power is somewhat simplified.

MARINE REVIEW: Our boilers were 13' 6" diameter and 12' long, made of six sheets of steel an inch or more thick. The feed water came in at the after end of boiler, above the tubes. Whenever we blowed off a boiler to clean it and then filled with cold water and started a slow fire, the seams running lengthwise of the boiler in the front course would leak in spite of us. These were one-third of the way up from the bottom and were butt-strapped. We suppose this is caused by expansion, but would like to know how.

M. E. B.

Your surmise is probably correct in this way: The cold feed water entering at the top of the body of water in the boiler, no circulation takes place, and the heat of the fires raising steam will cause the top of the boiler to expand according to the temperature of the steam, whilst the lower half in contact with cold water is in a normal condition. This difference in expansion of the top and bottom of the boiler puts the sheets and parts in a strain; something has to give, and since there is no provision for this expansion the seam between the extreme heat of the top and the cold of the bottom catches the worst. If you had a circulation in the boiler so that the temperature of water in the boiler was the same at all points, the boiler would probably not leak from this cause and you might incidentally expect a better evaporation per pound of coal.

Best Material in Hulls.

Editor MARINE REVIEW.—Your valuable article on "Demand for Best Material in Hulls," which was so full of good, solid business sense was widely commented upon, and will doubtless be prolific of much good. One question asked is more than ordinarily pertinent, viz., "Why is it that inferior material, such as Bessemer and Basic steel, should be permitted to be used for this purpose?" Replying to this question fully, would, I am afraid, occupy too much of your valuable space. You may permit me, however, to say for the general good of your thousands of interested readers on the steel questions of the hour that there is, even in this scientific and demonstrative age, more of gross superstition or profound ignorance in connection with the manufacture and working of steel than would do credit to a full fledged Chinese joss house. For instance, we have heard it repeated hundreds of times—and the idea is almost universal even among skilled workmen—that the more you hammer a cutting tool for a lathe or planer the better it becomes. The embryo of logical reasoning applied to this antiquated superstition at once evaporates it. In order to increase the quality of any steel, Bessemer, open hearth or crucible, and make it superior to what it actually is in ingot form, it is absolutely necessary to add to it some substance of quality superior to itself, or eliminate some deleterious matter which it contains, and thus obtain superior results in relative proportion to the operation. The question then arises, What superior substance is compounded with, or deleterious matter eliminated from, the steel by any amount of extra hammering? Why none. Then it must be the same steel? Yes, just the same. Not any better? No, not a particle; and just as soon as that steel is heated for the purpose of hardening, it assumes its original molecular form, but in process of hardening becomes more compact or dense, thus imparting its cutting properties. It may be well perhaps to say here that steel does not, as is generally supposed, become dense in form in proportion to the high heat at which it is cooled. This is a terrible mistake, and its folly has cost the manufacturers of this country millions of dollars in replacing steel manipulated by unskillful workmen. It must be clearly understood—and there is no variation to this rule—that no steel, by whatever process manufactured, will admit of a temperature for hardening greater than the relative proportion of carbon it contains and be successful. For instance, a piece of tool steel with three-fourths of one per cent. of carbon, heated to a clear red and plunged into water, would, if good material, show a very dense, silky, yet ductile fracture. Another piece of steel made from the same stock, containing 1½ per cent. of carbon, cooled at the same temperature, would show in the fracture a coarse, granular and gray appearance, and although harder steel it would be comparatively worthless. Reheat this piece of steel to a dark red and then cool it off, and you obtain for cutting purposes the best results that can be obtained with it. If it should fail at this stage it is because of the quality of the material from which it is made.

Hammering, if not overdone, and if the steel is not to be reheated after the operation, gives additional strength by the interlocking of its molecules. Another feature of this subject is the very erroneous idea that the finer and whiter the density of steel, the better is its quality. This is about as far from truth as it is possible to wander. Steel is hard and dense or close in fibre in proportion to the amount of carbon it contains, which really gives it its hardening properties, and the veriest trash often looks the prettiest in appearance to an unskilled eye. Similar superstitions—or shall I say lack of observation or carelessness—seem to have permeated the minds of thousands of men whose reputation and interests are involved by the choice between Bessemer, Basic and acid steel. I would be pleased to delineate the various modes of manufacture, if space permitted, and to demonstrate so clearly that contradiction would be impossible, that for all structural material, boiler plates, water pipes

and marine construction acid open-hearth steel should be imperatively demanded.

It is universally recognized that phosphorus in steel, under all circumstances, is a disturbing element; so much so, that a combination of other destructive elements have been lost sight of in the demand for a low phosphorus steel. The Basic open-hearth process is acknowledged as the best for eliminating phosphorus from the metal used, but very unfortunately, especially in times like the present when low prices prevail, temptations are offered for using a very high phosphorus, and a much more worthless material, which is in fact utterly unworthy of use for high grade steel purposes. Is it any wonder, then, that Bessemer and Basic steel, proverbial for irregularity and unworthiness can be sold for less money than the new and eminently superior acid steel, for the manufacture of which the best and purest material must be secured at whatever cost the world's market will offer. It has been so clearly demonstrated that the acid open-hearth process is the best, and that neither science nor mechanical skill can produce by the Basic process anything approximating the uniformity, reliability and utility of the acid process, that its product is demanded by the United States government and by leading private enterprises, and it is not overstepping the bounds of reason or justice to claim that wherever property, limb or life is subject to risk, the steel product according to this process should by law be made imperative.

I would not, however, deprecate the worth of the Basic steel. I am free to admit the possibility of manufacturing steel by this process within given limits of physical and chemical requirements, providing they are wide enough. Yet the very fact of its irregularity is productive of greater evils than if it were all made even of little inferior quality, if its uniformity could thereby be assured. Of this, however, the nature of the Basic furnace will not permit. Suppose I give an order to the most reputable manufacturer in the country for 300 tons of Basic steel, demanding certain physical and chemical requirements. There would be no doubt that the phosphorus limit could be reached, even though the steel was made from almost worthless material. In fact, it would in all probability be less than was specified, to which, of course, there could be no valid objection. Yet the physical requirements, the *multum in parvo* of real necessity, would vary from lines drawn just within and running clear across the whole field of ultimate limit, and yet this steel may be applied to some particular construction, subject to atmospheric influences, alternately hot and cold with the change at times sudden; or may be it is exposed to the crystallizing action of water from alternate pressure within, as in steel waterways, or the continued action of waves from without, as in vessels. It is difficult to arrive at the cause of a bursting boiler, a warped or cracked armor or ship plate, or a flooded city by defect in a water main causing tumult, destruction and death. All this to save a couple of dollars per ton in first cost of construction. Gentlemen, build your ships, your bridges, your water-ways and your boilers of the best material, and if we are killed let us know you did what you could to save us.

Chicago, Ill., March 10, 1894.

BEN CATLEY.

AN ALPHABETICAL LIST OF 1,200 VESSELS—THE BUSINESS FLEET OF THE LAKES—WITH THE PORTS AT WHICH THEY WERE TIED UP FOR THE WINTER, WAS PUBLISHED AS A SUPPLEMENT TO THE REVIEW AFTER THE CLOSE OF NAVIGATION LAST FALL. THIS LIST MAY PROVE SERVICEABLE TO BROKERS, SHIP CHANDLERS AND OTHERS IN PREPARING FOR THE OPENING OF ANOTHER SEASON. FOR 10 CENTS IN STAMPS WE WILL FORWARD A COPY OF THIS LIST TO ANY ADDRESS.

Life Saving Appliances.

The illustration herewith shows the world's fair exhibit of Thomas Drein & Son, Wilmington, Del. Following is the award made on the exhibit: "Metallic life raft for passenger steamers—This exhibit is a good specimen of a life raft. Its buoyancy is furnished by two cylinders, one on each side, which are subdivided into separate air-tight compartments. The platform is elevated well above the water and altogether they appear to be a buoyant, useful and safe form of raft. Recommended for an award for its buoyancy, and suitability for use as a life saving raft in ships."

The recommendation is signed by Francis Elgar and attested by H. Von Littrow, president, and Alex. Oldrini, secretary of the committee on awards. The head of the firm, William M. Drein, is a practical ship builder, having built his first boat, for the government, when he was but sixteen years old. The business of this firm was established at Wilmington in 1866 and has grown to such proportions that it not only supplies the coast, lake and river trade of the United States with life rafts, boats and life preservers, but furnishes outfitts for boats on the Clyde. There are many advantages in the devices produced by this firm, particulars of which will be furnished on application.





GARLOCK PACKINGS.

Our Elastic Ring, Sectional, Spiral and Special Water Packings are the leaders in this line. For Steam, Water, Ammonia, High Speed Work and all places where packings are used they excel. Try our Special Water Packing, fully guaranteed for water end of pumps. See that our trade mark is on each package. Correspondence solicited.

NEW YORK, 136 Liberty St.
CHICAGO, 56 & 60 So. Canal St.
PHILADELPHIA, 28 N. 5th St.

PITTSBURGH, 99 First Ave.
OMAHA, NEB., 922 Farnam St.
ST. LOUIS, 415 Morgan St.

Factories and Main Offices: PALMYRA, N.Y. ROME, CA.



THE GARLOCK PACKING CO.

WILLIAM L. BROWN,
PRESIDENT.

W. F. COBB,
VICE-PRESIDENT.

W. I. BABCOCK,
MANAGER.

O. R. SINCLAIR,
SECRETARY.

CHICAGO SHIP BUILDING COMPANY,

LONG DISTANCE TELEPHONES.

Ship Yard Office,
"South Chicago 40."

Chicago Office,
1013 Rookery,
"Main 3447."

STEEL STEAM-SHIP BUILDERS.

101st St. and Calumet River, SOUTH CHICAGO, ILL.

"YARROW WATER TUBE BOILER"

Saves weight and increases speed of vessel.

THE HORNET fitted with this boiler attained a mean speed of 28 knots an hour. Particulars of the above and a list of vessels where applied furnished on application.

Sole Manufacturer under the Patents

HORACE SEE, No. 1 Broadway, NEW YORK

UPSON-WALTON CO.,
Agents, Cleveland, O.
H. D. EDWARDS & CO.,
Agents, Detroit, Mich.
G. B. CARPENTER & CO.,
Agents, Chicago, Ill.

TYZACK'S
TRIPLE-GRIP
STOCKLESS ANCHORS.

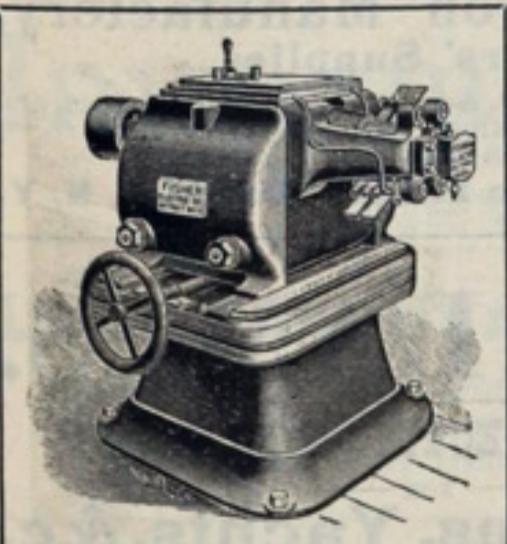
DE GRAUW, AYMAR & CO.
General Agents
for the United States.
No. 34 and 35 SOUTH STREET,
NEW YORK CITY.

FOR SALE

STEAMER JOSEPH L. HURD,

well adapted for package freight or lumber traffic, also one or more of the fine passenger and freight steamers of this company's fleet, now laid up in Chicago, Ill.

Lake Michigan & Lake Superior Transportation Co.
7 Rush Street, CHICAGO, ILLS.



" Ninety per cent. of the Electric Lighting Plants
on the inland lakes have been installed by
the Fisher Co., of Detroit, Mich.

ALL THE GREAT FLEETS ARE EQUIPPED WITH
OUR PLANTS.

Fisher Electrical Mfg. Co. 183-185-187 LARNED ST., W. Detroit, Mich.

F. W. WHEELER,
President.

E. T. CARRINGTON,
Vice-President.

F. L. GILBERT,
Secretary.

F. W. WHEELER & CO., WEST BAY CITY, MICH.

Builders of all kinds of METAL AND WOODEN SHIPS.

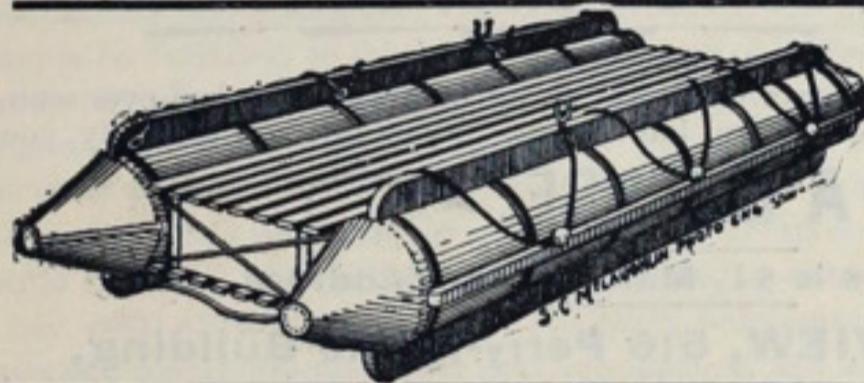
AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting
CHAINS.

Our DREDGE and CRANE CHAINS are made of IRON ROLLED
SPECIALY for that purpose. Send for Price List

J. B. CARR & CO., Manufacturers, TROY, NEW YORK.



Thos. Drein & Son,

BUILDERS OF

Metallic Life Boats and Rafts,
Government and Pleasure
Boats. Block and Granulated
Cork Life Preservers. Outfit
for Lake Steamers a Specialty.
TATNALL & RAILROAD STS.
Wilmington, Del.

THE "CINCINNATI" AUTOMATIC STEAM STEERING GEAR

A Simple, Powerful Machine. Noiseless and Sure.

CRAWLEY & JOHNSTON,
119-121-125 E. Pearl St., CINCINNATI, OHIO.

An Excellent Engineering Library—Cheap.

Roper's Land and Marine Engines, - \$3.50
Useful Hints to Sea-Going Engineers, - 1.50
Leask's Triple Expansion Engines, - 2.00
\$7.00

SEND \$6 TO THE
MARINE REVIEW, 516 Perry-Payne Bldg.,
CLEVELAND, O.,

for these books, or the amount specified for any one of the three.
Money refunded if not satisfactory.

H. G. TROUT, KING IRON WORKS,

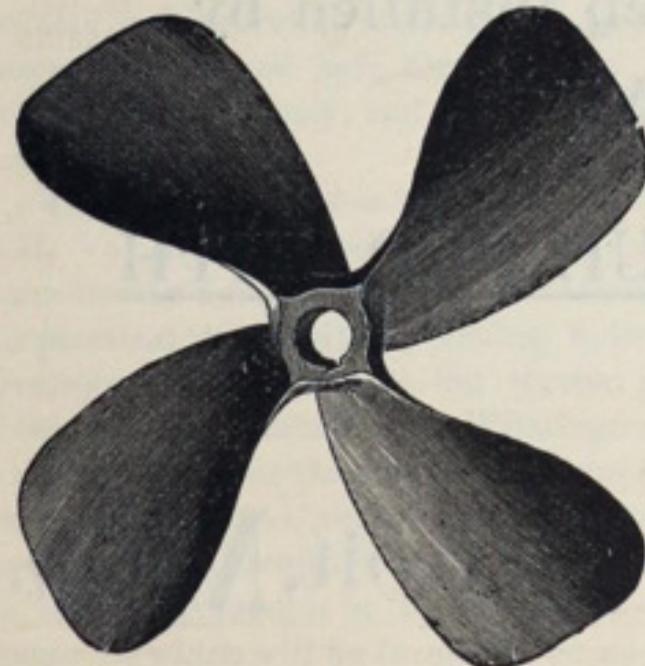
BUFFALO, N. Y.,

MANUFACTURERS OF

TRIPLE EXPANSION,
THREE CYLINDER,
FORE AND AFT
And STEEPLE COMPOUND
MARINE ENGINES,

High and Low Pressure Engines,
Sectional, Propeller,
Tug and Yacht Wheels.

Cowles Aluminum and Manganese
Bronze Propeller Wheels.



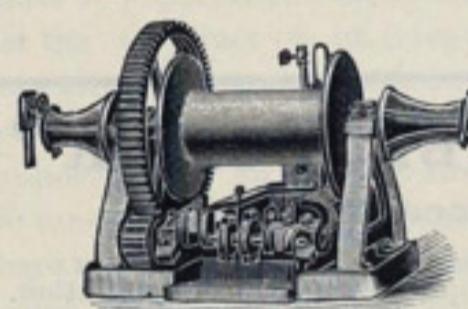
These Wheels are noted for their extra
speed, towing power and proportionate
saving of coal.

PRICES QUOTED ON APPLICATION.

For BOLTS, NUTS, WASHERS, RIVETS Etc., Etc.

ADDRESS:

Sternbergh & Son,
READING, PA.



JACKSON & CHURCH,

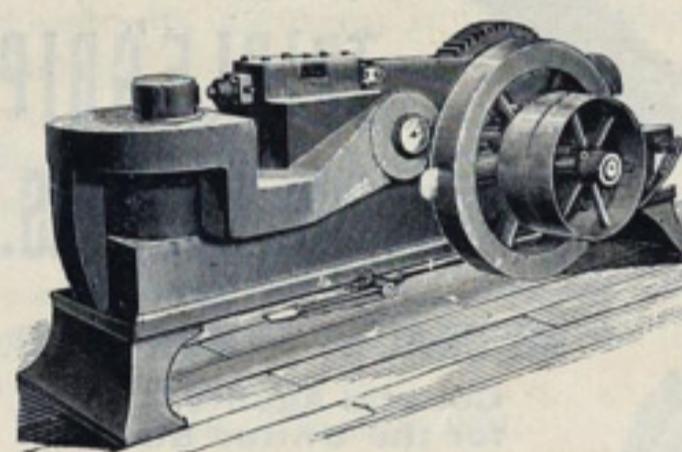
Builders of DUPLEX HOISTING and DECK ENGINES.

Plain Finished and Automatic ENGINES, From Heavy Patterns
at Moderate Prices.

Vertical, Horizontal, Marine & Locomotive BOILERS Strictly First-Class
and Highest Test.

Send for Circulars and Prices. SAGINAW, MICH.

The Excelsior Machine and Cleveland Punch and Shear Works Co.



SUCCESSORS TO

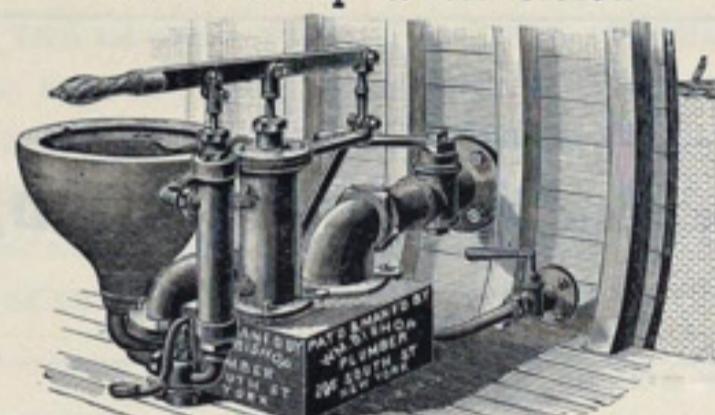
LEIGHTON & HATHAWAY.

Manufacturers of

Punches, Shears, Bending
Rolls, Rotary Planers, Over-
head & Post Drill Presses.

980 to 986 Hamilton St.,
CLEVELAND, OHIO.

Patent Pump Water Closet.



For Yachts, Pilot Boats,
Naval Ships, Etc.

For above or below water line. In
use on U.S. Cruisers New York, Colum-
bia, and Battleships Indiana,
Maine, Texas, Massachusetts, Etc.
Our No. 4 can be put in a space
65 in. x 15 in.

WILLIAM BISHOP & SON,

205 South St., NEW YORK,

724 Third Ave., BROOKLYN.

Telephone 569 Franklin.

Yacht Fittings a Specialty.

C. H. McCUTCHEON,

(Successor to SAMUEL McCUTCHEON.)

Copper, Tin and Sheet Iron Manufactory, Steamboat and Engineers' Supplies.

All kinds of Brass Cocks, Globe Valves and Couplings, &c. Iron Pipe and Fittings, and
Mill Supplies. Rubber Belting, Hose and Packings, Springs, Valves, &c.,
Leather Belting and Usudurian Packing.

Telephone No. 68.

No. 18 Ohio Street, BUFFALO, N. Y.



SHIP LAMPS.

OIL AND ELECTRIC FIXTURES

FOR
Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.,

(FORMERLY WILLIAMS, PAGE & CO.)

227 to 233 Cambridge St.,

BOSTON, MASS.

"PL" DIXON'S "PL" GRAPHITE.

Dixon's Perfect Lubricating Graphite is indispensable to every engineer and machinst. It can be used dry or mixed with water, oil or grease. We send free of charge a sample and pamphlet with interesting and instructive information.

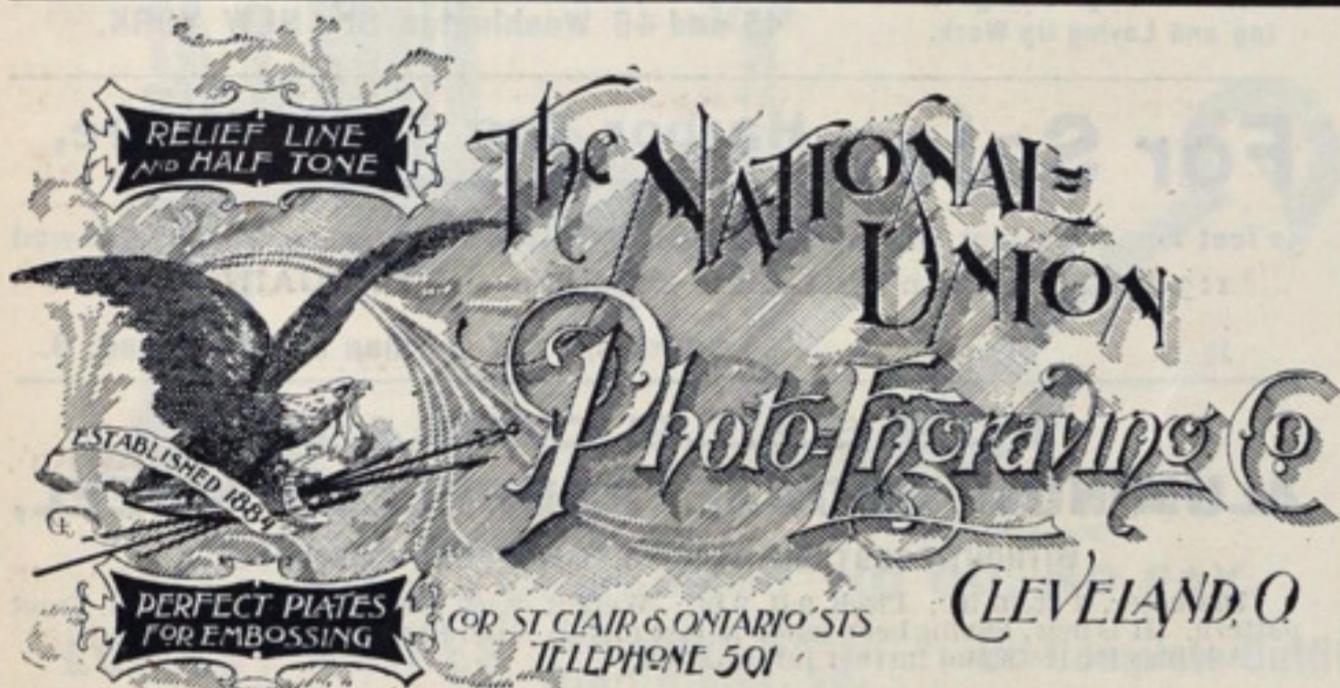
JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

"The man who knows so much about his profession that he cannot learn something about it by reading and study, has a very small profession or a very large cranium."

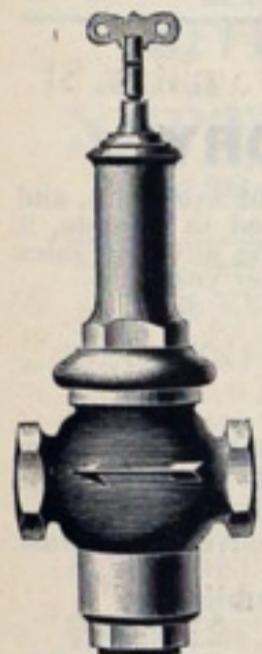
Marine and Mechanical Literature and Periodicals.

	Per Year.
Nautical Dictionary, [Patterson].....	\$ 5 00
Nautical Dictionary and Marine Review.....	6 00
Engineering, [London], Weekly.....	10 00
Engineering, [London], Weekly and Marine Review.....	11 00
The Engineer, [New York], Semi Monthly.....	2 50
The Engineer, [New York], and Marine Review.....	4 00
Engineering, [New York], Monthly Magazine...	3 00
Engineering, [New York] and Marine Review..	4 00
American Shipbuilder and Marine Review.....	3 00
Emerson Binder, [that will hold 52 Nos. of the Marine Review].....	1 00

MARINE REVIEW,
516 Perry-Payne Bldg., CLEVELAND, O.



THE MASON REDUCING VALVE



Was adopted by the U. S. Naval Engineering board. It is the standard in the Danish and other foreign navies; also on the Pennsylvania and 120 other railroads. It is made to wear.

MASON REGULATOR CO.
BOSTON, MASS.

1880.

1893.

CHAS. H. POTTER & CO.,
Investment Bankers,
Cleveland, O.

Dealers In
Lake Superior Iron Mining Stocks,

on about 10 per cent. annual dividend basis, Republic Iron Co., Lake Superior Iron Co., Champion Iron Co., Minnesota Iron Co., Jackson Iron Co., Cleveland-Cliffs Iron Co., Chandler Iron Co., Chicago and Minnesota Ore Co.

CONNELLY BROS. & CO.

OHIO, Cor. Michigan St., BUFFALO, N.Y.

**SHIP CHANDLERY, PAINTS, OILS,
AND VESSEL SUPPLIES.**

Syracuse Tube Company, SYRACUSE, N. Y.

MANUFACTURERS OF
BOILER TUBES
OF THE BEST GRADES ONLY.

The Belleville Boilers in the two Great Northern Steamers are constructed of Syracuse Tubes.

SHERIFFS MANUFACTURING COMPANY,

C. STARKE, Pres. W. H. MEYER, V. Pres.
THOS. W. SHERIFFS, Manager.

MANUFACTURERS OF
MARINE :: ENGINES,
PROPELLER WHEELS,
Dredge Machinery of Latest Design.

MARINE REPAIRS AT ALL HOURS.
Agents for Marine Trade for
BANCS' OIL CUPS.



124, 126, 128, 130 & 132 Barclay Street,
MILWAUKEE, WIS

Telephone 163. Correspondence Solicited.

MARINE REVIEW LINER EXCHANGE.

Space under this heading may be used gratis by our advertisers or subscribers to call attention to vessels or any craft, machinery, new or second hand, that they may have for sale. Those wanting machinery of any kind, or wishing to purchase vessels, are invited to take advantage of the same offer. Employers in need of professional men or men who want positions may avail themselves of the opportunities offered. Each item will be limited to three lines. Letters concerning same must mention number attached to item and be addressed MARINE REVIEW, 516 Perry-Payne Building, Cleveland, O.

245—FOR SALE—Harbor tug. T. M. Moore.

246—FOR SALE—Second hand compound engine 14 and 24 by 24, and a 10 $\frac{1}{2}$ and 18 by 18; both have force and air pumps attached.

247—FOR SALE CHEAP.—Triple expansion engine, 6 $\frac{1}{2}$, 10 and 16 in. by 16 inches stroke; also a water tube boiler 6 by 7 by 6 $\frac{1}{2}$ feet high, allowed 200 pounds pressure.

248—FOR SALE FOR \$1,000.—Full cabined steam yacht, 60 feet long and 10 feet beam; speed 14 miles; used two years and cost \$3,500.

249—WANTED—Steamer that will accommodate party of 35 or 40 for a period of two weeks. Will charter in June or July. Give description of boat and price.

250—FOR SALE—Very cheap, tug or barge engine, 17x20; would exchange for small compound.

STERLING, WELCH & CO.

12 and 14 Euclid Ave., CLEVELAND, O.

BOAT FURNISHING A SPECIALTY.
CARPETS, OIL CLOTHS,
CURTAINS, &c., &c.
SUPPLIED AT WHOLESALE RATES.

THE SWAIN WRECKING CO.
E.M. PECK, Pres.

The TUG FAVORITE STATIONED AT CHEBOYGAN, MICH. WITH COMPLETE WRECKING OUTFIT IN CHARGE OF CAPT. MARTIN SWAIN. THE CANADIAN WRECKER SAGINAW STATIONED AT DETROIT, MICH. EXPLORER US TUGBOAT IN CANADIAN WATERS. STEAM PUMPS AND SUB-MARINE WORK IN CHARGE OF JOHN D. QUINN. OFFICE PARKER & MILLEN IS situated on West Detroit River.

4 STEAM PUMPS, 10 JACKS, 3 HAWERS.

1894. MARCH. 1894.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1894	1894	1894	1894	1894	1894	1894
1	2	3	4	5	6	7
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

10-100 TON JACKS
1-12 INCH HAWSER
1-10
1-9

TELEGRAPH
APT. M. SWAIN,
CHEBOYGAN,
MICH.

PARKER & MILLEN.
DETROIT.
MICH.



TO THOSE INTERESTED IN, OR USING VALVES.

We have recently made improvements in the manufacture of JENKINS BROS. VALVES, having increased the number of bolts, thickness of flanges, etc.

We shall manufacture ONE GRADE OF VALVE ONLY, suitable for high or low pressure steam.

The Jenkins Discs used in these valves are suitable for HIGH OR LOW PRESSURE. We guarantee all valves stamped with Trade Mark.

JENKINS BROS.,
CHICAGO.
BOSTON and PHILADELPHIA.

MARINE WORK A SPECIALTY.

PRICES REASONABLE

Lorain Machine and Repair Shop,

ED. A. FULLER, PROPRIETOR,

Broadway, between Fifth and Sixth Aves., LORAIN, O.

Shop well equipped for repairs to machinery while boats are discharging and taking on cargoes.

EDWARD C. WEAVER, LL. M.,

900 F. (op. Pat. Office.)

Washington, D. C.

Attorney and Counselor

in Patents, Trade

Marks, Revenue

Claims and all claims

against the U. S. Make

a clear statement of

your invention or

claim, and I will

advise you free of

charge. Send stamp

for my pamphlet.

MAKE YOURSELF A
MECHANICAL ENGINEER
OR DRAUGHTSMAN;

or qualify to take charge of, or superintend the manufacture of machinery, by devoting your idle hours to
HOME STUDY by the method or

The Correspondence School of Mechanics,
SCRANTON, PA.

The course embraces Arithmetic, Algebra, Geometry, Trigonometry, Elementary Mechanics, Hydromechanics, Pneumatics, Heat, Mechanical Drawing, Steam and Steam Engines, Strength of Materials, Applied Mechanics, Boilers, Machine Designs, Electricity, etc. To begin, students need only know how to read and write.

MODERATE CHARGES. SEND FOR FREE CIRCULAR. DIPLOMAS AWARDED.

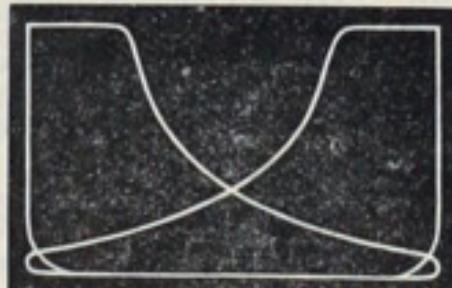


PATENTS.

FRANK L. DYER,

918 F. Street,
Washington, D. C.

References: American Steel Barge Co.;
Capt. Alexander McDougall.



THE WELLS LIGHT

WALLWORK & WELLS' PATENTS.

2000 CANDLE POWER!

ESPECIALLY ADAPTED FOR

Dry Docks and Night Loading.

PORTABLE,
ENTIRELY SELF-CONTAINED,
REQUIRES NO OUTSIDE MOTIVE POWER,
UNAFFECTED BY WEATHER,
NO SPRAY, NO SMOKE, SAFE AND ECONOMICAL.
IN USE ON 15 DRY DOCKS ON THE LAKES.

ALSO ADAPTED FOR
Iron and Steel Heating.

For Hull and Boiler Plates,
Tubes, Bending, Straightening
and Laying Up Work.

For further particulars, address

WILLIAM HALPIN,

Successor to KEEGAN & HALPIN,

45 and 46 Washington St., NEW YORK.

For Sale

Harbor Tug T. M. Moore,

52 feet Long, 14 feet Beam, 6 feet Hold. Sutton Engine, 15 1/2 x 17, Allowed 115 lbs. Steam. In First-Class Condition. A BARGAIN.

15-22

Address, 137 Herman St., Cleveland, O.

FOR SALE CHEAP!

ALUMINUM BRONZE PROPELLER WHEEL,

WITHOUT DOUBT THE STRONGEST WHEEL IN EXISTENCE.

Diameter, 7 ft. 6 in.; Pitch, 9 ft. 9 in.; Weight, 2,100 lbs. Made from H. G. Trout pattern. It is new, having been made to test metal. Hub has not been bored. Address for tests and further information,

Cowles Electric Smelting and Aluminum Co., Lockport, New York.

SUCCESS ASSURED
FOR THE 1894 EDITION OF

THE INLAND MARINE DIRECTORY.

The 7th annual edition of this Directory will come from press about April 15th, and in its leading feature, "Correct Lists of Vessels," including those owned in Canada, it will eclipse all Vessel Registers or Directories heretofore published. Its advance sales and advertising patronage are both at this date larger than in any former year.

YOUR ADVERTISEMENT IS SOLICITED.

YOUR TRADE WILL BE BENEFITTED BY IT.

YOUR CUSTOMERS WHO USE IT

will be glad to number you among its supporters.

It is the only Directory of the merchant marine published. Subscription price \$5.00, payable on delivery, which includes your name and address under one to three headings in Business Directory portion of the work.

Write me for terms and space relative to advertising. Matter for advertising must be at hand by April 1st.

HARVEY C. BEESON, Publisher,

14 WALKER BLOCK,

DETROIT, MICH.

Roper's Practical Hand-Books

BY STEPHEN ROPER, Engineer.

TITLES AND PRICES.

A Catechism of High Pressure or Non-Condensing Steam Engine.....	\$2.00
Engineer's Handy Book.....	3.50
Hand-Book of Land and Marine Engines.....	3.50
Hand-Book of Modern Steam Fire Engines.....	3.50
Hand-Book of the Locomotive.....	2.50
Instructions and Suggestions for Engineers and Firemen.....	2.00
Questions and Answers for Engineers.....	3.00
The Steam Boiler: Its Care and Management.....	2.00
The Young Engineer's Own Book.....	3.00
Use and Abuse of the Steam Boiler.....	2.00

Any of the above books will be sent to any part of the United States or Canada on receipt of list price.

Descriptive catalogue mailed free by

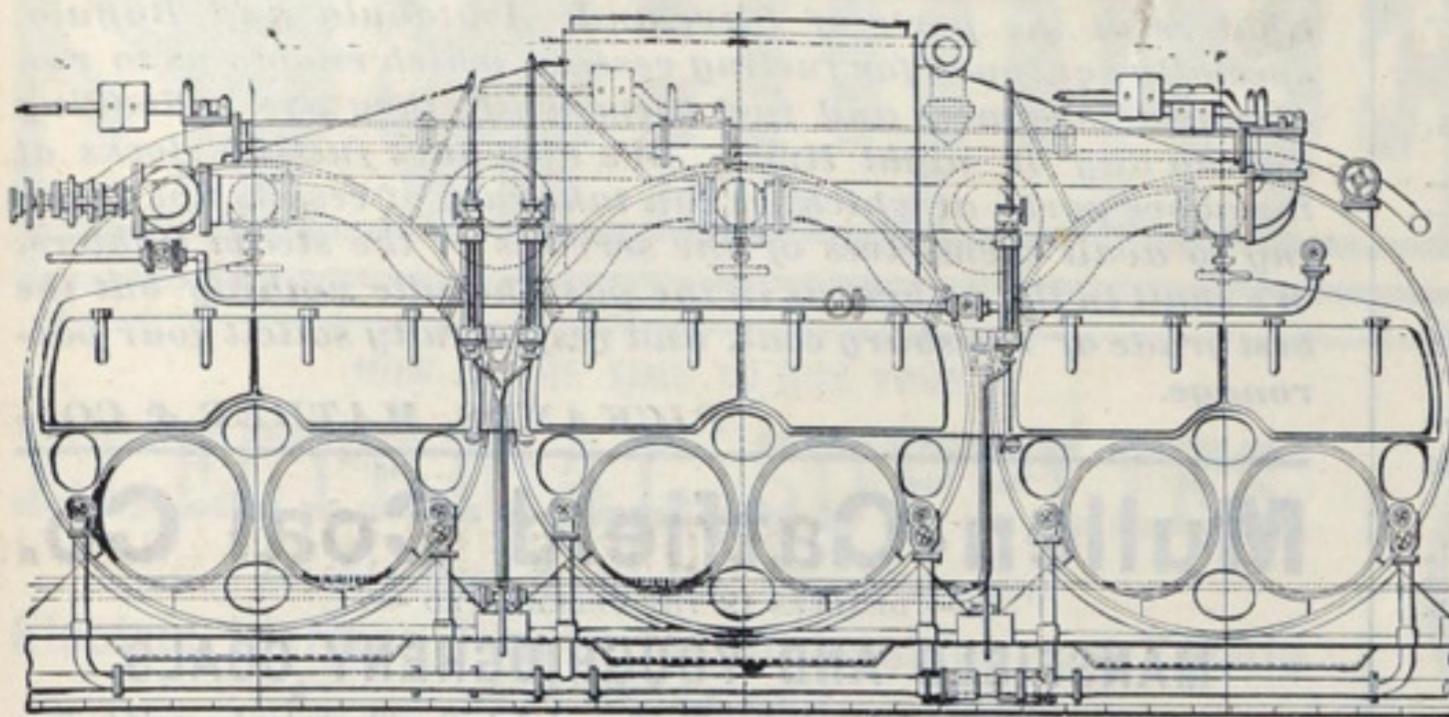
EDWARD MEEKS, Publisher,

1312 Filbert st., Philadelphia, Pa.

P. M. CHURCH & CO.,
SAVINGS BANK BLOCK,
LEADING DEALERS IN
Ship Chandlery,

Marine Hardware, Paints, Oils, Packings, Cordage, Etc.
FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION.

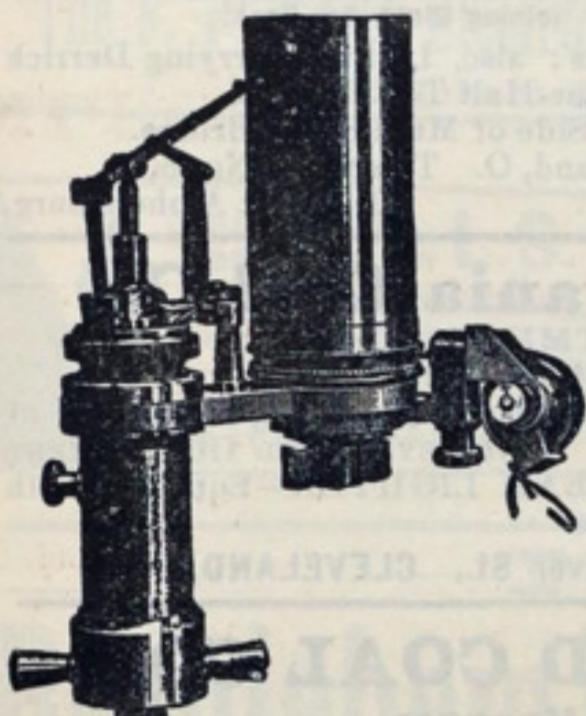
LAKE ERIE BOILER WORKS, BUFFALO, N. Y.



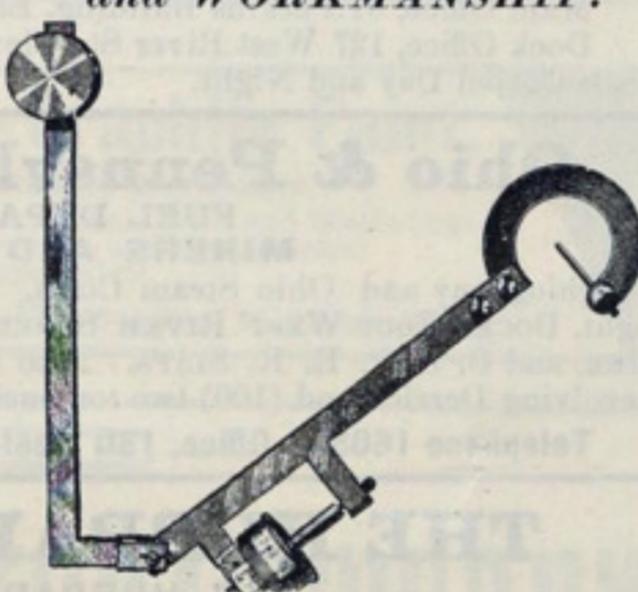
THE BEST EQUIPPED PLANT
IN AMERICA
FOR THE MANUFACTURE OF
MODERN MARINE BOILERS.

FIRST-CLASS INSTRUMENTS

of APPROVED DESIGN,
BEST MATERIAL
and WORKMANSHIP.



CALKINS'S STEAM-ENGINE INDICATOR.



POLAR PLANIMETER.

Performance Guaranteed—**NO CO, NO PAY.**
LOWEST PRICES Indicator, \$25,
EVER Planimeter, \$5,
OFFERED: Pantograph, \$5,
Three-Way Cock, \$5,
\$40.
ADDRESS: Manufacturers of Water Meters
NEPTUNE METER CO., and Steam Engine Indicators,
408-409-410 Temple Court Bldg., NEW YORK CITY

AN EXCELLENT LIBRARY FOR A MARINE ENGINEER, CHEAP—KEY TO ENGINEERING; WHAT AN ENGINEER SHOULD KNOW ABOUT ELECTRICITY; ENGINEERS' CATECHISM. ANY ONE OF THESE ARE WORTH A DOLLAR, BUT ALL THREE CAN BE HAD FOR \$1. SEND TO THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND, O. MONEY REFUNDED IF NOT SATISFACTORY.



Straight Line Indicator,
Price, \$30.
In polished
case.
3 Springs and Treatise.

STEP FORWARD
AND OWN AN
INDICATOR
and know how to
to use it.
Send for circular.

He is using the best
till he has tried
EUREKA
PACKING
For Steam, Water
and Air.
Send for Sample.

NO MAN CAN SAFELY SAY

HINE & ROBERTSON, 40 Cortlandt St., N. Y.

T.S. & J.D. NEGUS

Have the largest and finest stock of Nautical Instruments and Charts in the United States.

Estimates given for
Outfits of Steamers and
Pleasure Yachts.

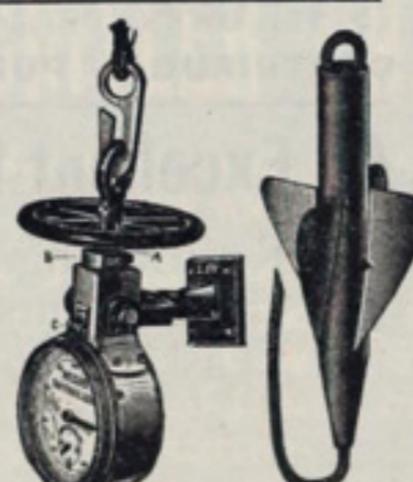
Compass Adjusters.
Send for Catalogue
and Almanac.

140 Water St.,
New York City.

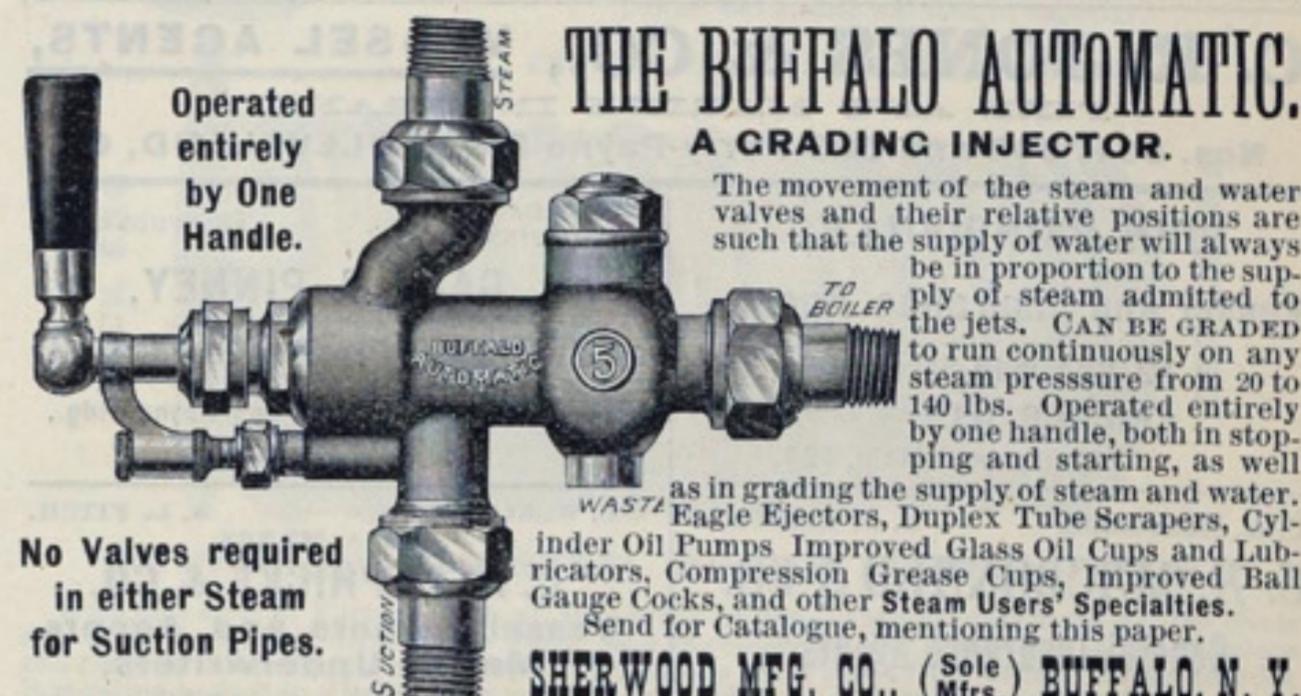
Every attention given
to Trade orders.



Special Agents for the Celebrated Ritchie Compass.



Try the new NEGUS LOG.
Best in the World.



Operated
entirely
by One
Handle.

No Valves required
in either Steam
or Suction Pipes.

THE BUFFALO AUTOMATIC.

A GRADING INJECTOR.

The movement of the steam and water valves and their relative positions are such that the supply of water will always be in proportion to the supply of steam admitted to the jets. CAN BE GRADED to run continuously on any steam pressure from 20 to 140 lbs. Operated entirely by one handle, both in stopping and starting, as well as in grading the supply of steam and water. Eagle Injectors, Duplex Tube Scrapers, Cylinder Oil Pumps Improved Glass Oil Cups and Lubricators, Compression Grease Cups, Improved Ball Gauge Cocks, and other Steam Users' Specialties. Send for Catalogue, mentioning this paper.

SHERWOOD MFG. CO., (Sole Mfrs.) BUFFALO, N. Y.

JUST PUBLISHED!

THE CORLISS ENGINE, and Its Management,

By HENTHORN & THURBER. Third edition with appendix, fully illustrated, 16 mo., cloth, \$1.00. Sent post paid to any address on receipt of price.

SPON & CHAMBERLAIN, 12 Cortlandt St., N. Y.

No master trading to Lake Superior should be without a chart of the north shore. We have them for sale at \$1 each.

"The most perfect feed water heater and purifier we ever saw."—R. HAMMOND.

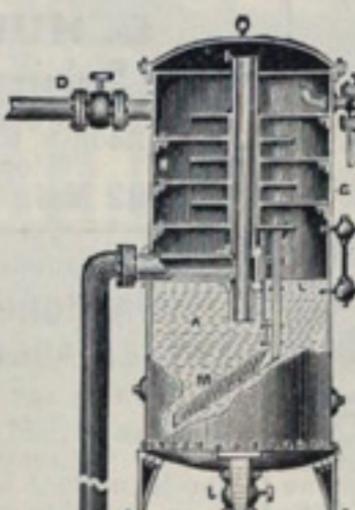
IN PRACTICAL USE ON 25 LAKE STEAMERS.

Every Purifier Warranted to Remove all Sediment or Scale-Forming Substance.

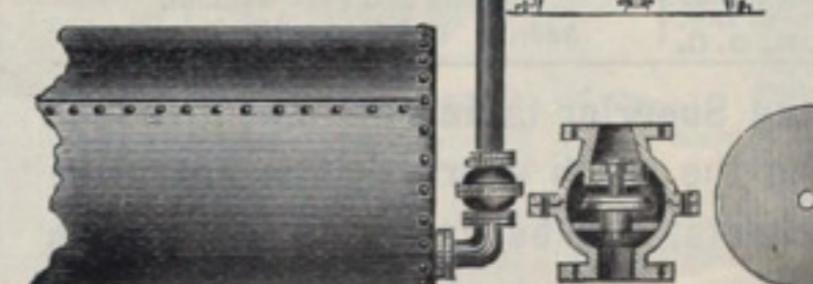
ROBERT LEARMONTH PATENTEE,

200 BOUCK AVENUE,

BUFFALO, N. Y.



THE BUFFALO
FEED
WATER
HEATER
AND PURIFIER.



REFERENCES.

- A.—Settling chamber.
- B.—Boiler.
- C.—Feed pipe to boiler.
- D.—Steam pipe.
- E.—Water supply pipe.
- F.—Check valve.
- G.—Spray disks.
- H.—Spray chamber.
- I.—Equalizing tube.
- J.—Blow-off pipe.
- K.—Automatic shut-off valve.
- L.—Division plate.
- M.—Deflector and separator.

HARVEY D. GOULDER,
LAWYER AND PROCTOR IN ADMIRALTY,
CLEVELAND, O.

W. H. COOK.
CAPT. J. A. CALBICK.
J. B. CLOUGH.
Tel., Main, 56. RIALTO BLDG., No. 23 Sherman St., CHICAGO, ILL.

COOK, CALBICK & CO.
Vessel Agents and Underwriters.

H. R. SPENCER,
ATTORNEY AT LAW and PROCTOR IN ADMIRALTY.
218 Superior St., DULUTH, MINN.

C. E. KREMER, Attorney and Counselor-at-Law and
Proctor in Admiralty.
Rooms 14, 15 and 16, Bryan Block, 164 LA SALLE ST., CHICAGO, ILL.

JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.
MITCHELL & CO., Vessel and Insurance Agents,
508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO.
Office Telephone, 757. Residence, John Mitchell, 3506.

C. R. JONES & CO., VESSEL AGENTS,
FIRE AND MARINE INSURANCE.
Nos. 501, 502 and 503 Perry-Payne Bldg., CLEVELAND, O.

JOHN PRINDIVILLE,
Vessel and Insurance Agent,
12 Sherman Street,
CHICAGO, ILL.
Telephone, Main, 129.

C. A. Macdonald. J. J. Rardon.
C. A. MACDONALD & CO.,
General Insurance Agents,
RIALTO BUILDING, CHICAGO, ILL.

H. S. LORD. J. H. NORTON.
LORD & NORTON,
Attorneys-at-Law,
Proctors and Advocates in
Admiralty,
DULUTH, MINN.

White, Johnson & McCaslin,
ATTORNEYS-AT-LAW,
—AND—
Proctors in Admiralty,
26-27 Blackstone Building,
CLEVELAND, OHIO.

THOS. WILSON,
MANAGING OWNER
WILSON'S TRANSIT LINE.
Gen. Forwarder.
Freight and Vessel Agent.
CLEVELAND, O.

C. F. Palmer. Chas. Hutchinson.
P. J. Minch.
PALMER & CO.,
Vessel Owners and Agents,
(John H. Palmer and John T. Hutchinson, Associates.)
Perry-Payne Bldg., Cleveland, O.

W. A. HAWGOOD. C. C. CANFIELD.
HAWGOOD & CANFIELD,
Vessel Agents and Marine Insurance,
604-605 Perry-Payne Bldg.,
Cleveland, Ohio.
Telephone No. 2335.

PATENTS

Promptly secured. Trade-Marks, Copyrights and Labels registered. Twenty-five years experience. We report whether patent can be secured or not, free of charge. Our fee not due until patent is allowed. **32 page Book Free.**
H. B. WILLSON & CO., Attorneys at Law, Opp. U. S. Pat. Office. **WASHINGTON, D. C.**

A British chart of Lake Superior taking in the entire lake and giving detail regarding the north shore that is not to be found on United States charts, can be had from the Marine Review for \$1.

To Owners and Masters of Steam Barges.

We beg to call your attention to the fact that we have steam lighters at the ports of Cleveland, Ashtabula and Buffalo, specially equipped for fueling vessels, which enable us to run alongside steamers and fuel them while they are unloading during day or night time. We also have fueling docks at the above ports, at which we can take care of vessels not desiring to avail themselves of the services of the steam lighters. We shall in the future, as in the past, handle nothing but the best grade of Pittsburg coal, and respectfully solicit your patronage.

PICKANDS, MATHER & CO.

Mullen-Gatfield Coal Co.

— DEALERS IN THE CELEBRATED —

MANSFIELD AND YOUGHOGENY COALS.

Docks at SANDWICH, ONTARIO, opposite the Fort at Detroit, with chutes for rapid fueling. Elevated docks and derrick at AMHERSTBURG, ONTARIO.

THE CUDDY-MULLEN COAL CO.

Dealers in COAL. Docks at Government Pier, Whiskey Island, and Adjoining Globe Dry Dock.

All fully equipped with Revolving Derricks; also, Lighter Carrying Derrick and One Hundred Two and One-Half Ton Buckets.
Main Office, 81 Perkins Building, East Side of Main Street Bridge.
Dock Office, 127 West River St., Cleveland, O. Telephone No. 8.
Boats Coaled Day and Night.

Docks at Amherstburg,

Ohio & Pennsylvania Coal Co.

FUEL DEPARTMENT.
MINERS AND SHIPPERS,

Youghiogheny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or night, Docks Foot WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with Revolving Derrick and (100) two ton buckets.

Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.

THE HUBBARD COAL CO.

S. B. HUBBARD, Manager.

WHOLESALE COAL.

JACKSON OUR SPECIALTY.
STEAMERS COALED.

Office with R. B. Hubbard & Son, Wholesale Lumber,
SANDUSKY, OHIO.



GRAVURES
OF
Great Northern,
L. M. & L. S. T. Steamers
and Centurion.

16c. each or 3 for 40c.

MARINE REVIEW,

516 Perry-Payne Bldg.,
CLEVELAND, O.

H. A. BARR, PRESIDENT, F. H. VAN CLEVE, SEC. CAPT. GEO. BARTLEY, SUPT. Escanaba. Escanaba.

ESCANABA TOWING & WRECKING CO., Escanaba, Mich.

Tugs, Lighters, Steam Pumps, Hawser, Hydraulic Jacks and Diving Appliances always ready.

TUG MONARCH, Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch.

Stroke, Steam Pressure Allowed, 125 pounds.

TUG DELTA, Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.

TUG OWEN, Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.

CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

An Excellent Engineering Library—CHEAP.

Reed's Engineers' Hand Book..... \$4.50

Useful Hints to Sea-Going Engineers... 1.50

Leask's Triple Expansion Engines 2.00

\$8.00

SEND \$7 TO THE
Marine Review, 516 Perry-Payne Bldg., Cleveland, O.,

For these Three Books,
The best of their kind published.

Money Refunded if Not Satisfactory.
Any one book sent for price quoted.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.
320 ATWATER STREET,
DETROIT, MICH.

NOW IS THE TIME TO BUY YOUR
ELECTRICAL SUPPLIES.

Lowest Prices. Best Goods. Prompt Shipment.

Electric Lighting Plants for Steamships and Yachts
A SPECIALTY.

Repairing Dynamos Promptly attended to Day or Night.
Try our new SELF-LUBRICATING DYNAMO-BRUSH.

PRICES and Other Information Cheerfully Given.

The F. P. Little Electrical Construction & Supply Co.
No 135 Seneca Street, BUFFALO, N. Y.

DO YOU?

attach importance to the economy that reaches down to touch the smaller items of your Expense Account?

True, it may perhaps involve only a few dollars in any one year, but in the selection of your STEAM PACKING, you can make those "few dollars" still fewer by confining your purchases strictly to the best made, viz.: "Genuine "Eureka" Steam Packing. Send for Sample to

HINE & ROBERTSON,

Cortlandt Street, New York.

NO. 8. Our List of Prizes interests all Engineers.

— THE — **Bethlehem Iron Company**

PRINCIPAL OFFICE and WORKS:

SOUTH BETHLEHEM, PENNA.

Steel Rails, Open Hearth, Bessemer and Nickel Steel
Billets and Forgings.

Hydraulic Forged Shafting, Hollow or Solid.
Crank, Rolls, Etc.

Rough Machined or Finished. Fluid Compressed Steel.

GUNS and ARMOR.

New York Office,
80 Broadway.

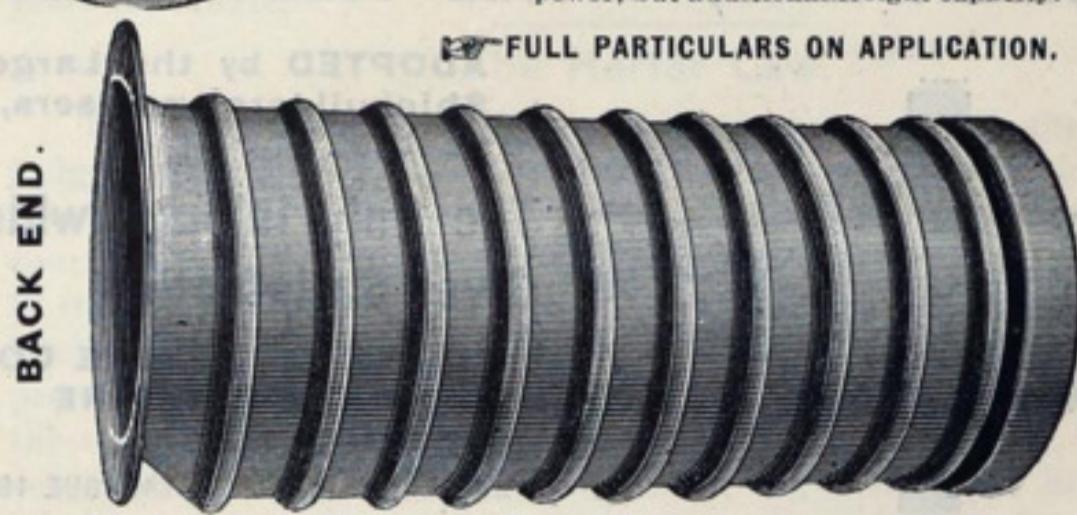
Philadelphia Office,
421 Chestnut St.



Serves' Ribbed Steel BOILER and STAY TUBES

Show an average economy in fuel of 15 per cent. In steamers this means not only so much saving in cost of coal or increased power, but additional freight capacity.

FULL PARTICULARS ON APPLICATION.



PURVES' RIBBED STEEL BOILER FURNACE FLUE.

With this style of Furnace Flue, all that has to be done to remove it is to cut out the rivets at the ends and slip it through the front; and to replace it, simply to slip it back in its place and rivet up the ends again without disturbing any other part of the boiler. No smith work is required to fit it in a boiler or to refit it when replaced. It is ready for use as it comes from the manufacturers. This style of flue has been in use six years without a single complaint.

Over 11,000 of Purves' Ribbed Steel Furnace Flues in successful use in Marine Boilers.

CHARLES W. WHITNEY,

Sole Agent for the United States and Canada,

81 and 83 FULTON ST., - - - NEW YORK.

THE CONDIT FULLER CO.

CLEVELAND, OHIO.

**BAR IRON, SHEET IRON, PLATE IRON, PIG IRON,
BOILER TUBES, BOILER RIVETS, PLATE STEEL,
CLINCH RINGS, GAS PIPE, BOAT SPIKES, STEEL NAILS.**

Sales Agents of
THE CARBON STEEL CO.

Manufacturers of
**OPEN HEARTH STEEL,
SHIP PLATES, BOILER PLATES,
ARCHES and STRAPS FOR VESSELS A SPECIALTY.**

Write for Prices and List of Sizes.

McMYLER MANUFACTURING CO., 180 COLUMBUS STREET, CLEVELAND, O.

— SOLE MAKERS OF THE —

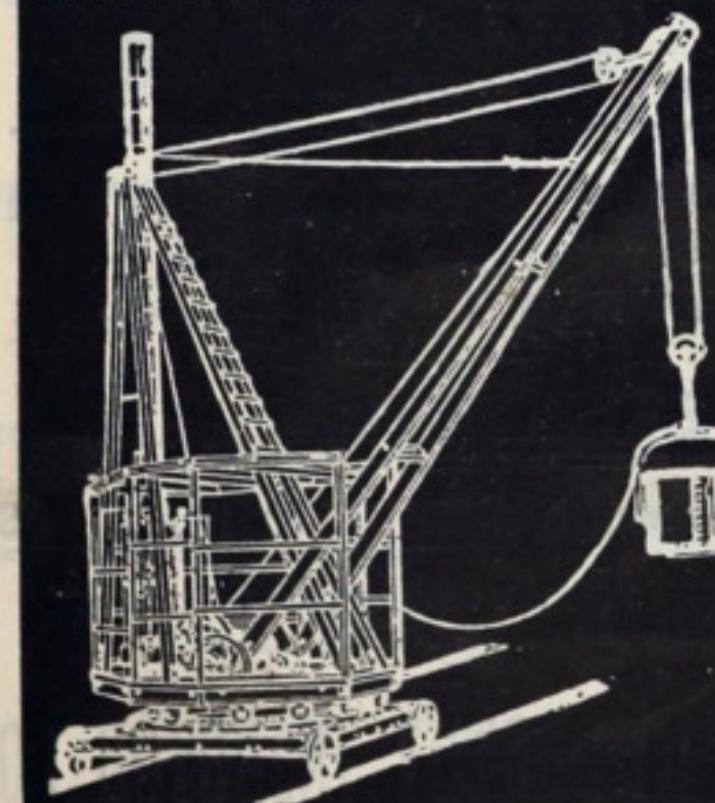
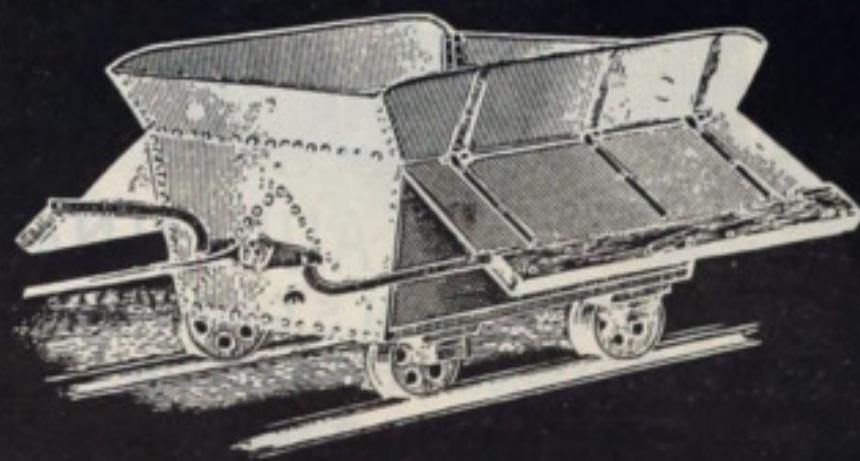
McMYLER PATENT REVOLVING STEAM DERRICK

FOR HANDLING COAL, ORE AND COARSE FREIGHT
OF ANY DESCRIPTION.

This Derrick can Lift Load, Alter the
Radius of Boom, Swing in Either
Direction at Will of Operator, and
can Propel Itself on Track any De-
sired Distance.

BUILT FOR ANY CAPACITY WANTED

BUILDERS OF
**CONVEYORS, COAL BUCKETS, ORE
BUCKETS AND DUMP CARS.**



FRONTIER

AMERICAN SHIP WINDLASS CO.

P. O. BOX 53, PROVIDENCE, R. I.

BUILDERS OF THE

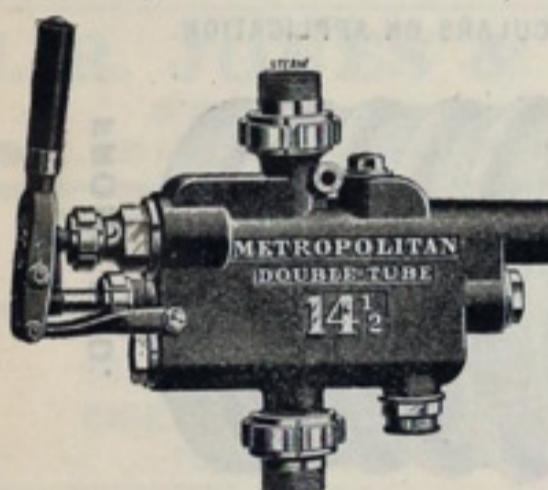
"Providence" Windlasses and Capstans

350 STYLES AND SIZES.
OVER 5000 IN USE.

SEND FOR CATALOGUE.

FRANK S. MANTON, AGENT.

THE METROPOLITAN DOUBLE-TUBE INJECTOR.



ADOPTED by the Largest
Shipbuilders and users,
as it is . . .

The Only Injector which
Gives Satisfaction

UNDER the SEVERE CON-
DITIONS OF MARINE
SERVICE.

SEND FOR OUR CATALOGUE 1894.

THE HAYDEN & DERBY MFG. CO.

No. 111 and 113 Liberty St., NEW YORK.

DAVID WHITNEY, JR., President.

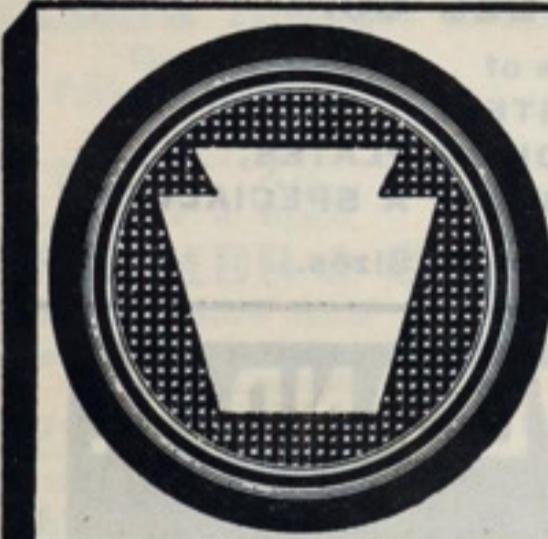
THE

F. H. WHITNEY, Secretary

MICHIGAN
Fire and Marine Insurance Company,
DETROIT, MICH.

CASH CAPITAL, - - - - \$ 400,000.00
CASH ASSETS, - - - - 840,000.00
LOSSES PAID, - - - - 1,800,000.00

THIS COMPANY DOES A GENERAL MARINE BUSINESS on the GREAT LAKES.
AGENTS AT ALL PRINCIPAL LAKE PORTS.



ERIE RUBBER CO.
ERIE, PA.
Manufacturers of the
KEYSTONE MARINE VALVE
THESE
RED RUBBER VALVES
ARE THE
BEST AIR & FOOT VALVES MADE.
IF YOUR DEALER DOES NOT KEEP THEM,
WRITE DIRECT TO THE FACTORY.

WARD BOILERS FOR
STEAMERS
LARGE OR
SMALL
LIGHT WEIGHT, GREAT POWER
THREE TYPES
LAUNCH, NAVY AND MARINE.
ADOPTED BY U. S. GOVERNMENT.
WAR VESSELS, LAUNCHES,
REVENUE CUTTERS, TUGS.
AFTER THE MOST EXHAUSTIVE COMPETITIVE TESTS. Correspondence Invited.

CHARLES WARD,
CHARLESTON, KANAWHA CO., W. VA.

IRON WORKS
MARINE
ENGINES,
DETROIT, MICH.

The Martin-Bassiss Co.

IMPORTERS AND MANUFACTURERS OF

*Mahogany, White Mahogany,
AND ALL NATIVE CABINET WOODS.*

HIGH GRADES OF KILN DRIED WOODS FOR
CABIN WORK AND INSIDE TRIM.

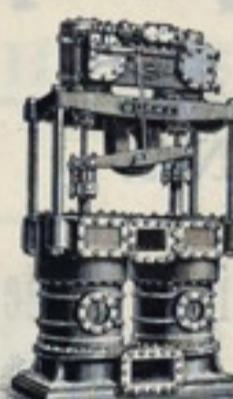
White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER
ON SHORT NOTICE.

654 Seneca Street,

Cleveland, Ohio.

THE GEO. F. BLAKE MFG. CO.



BUILDERS OF
MARINE PUMPS

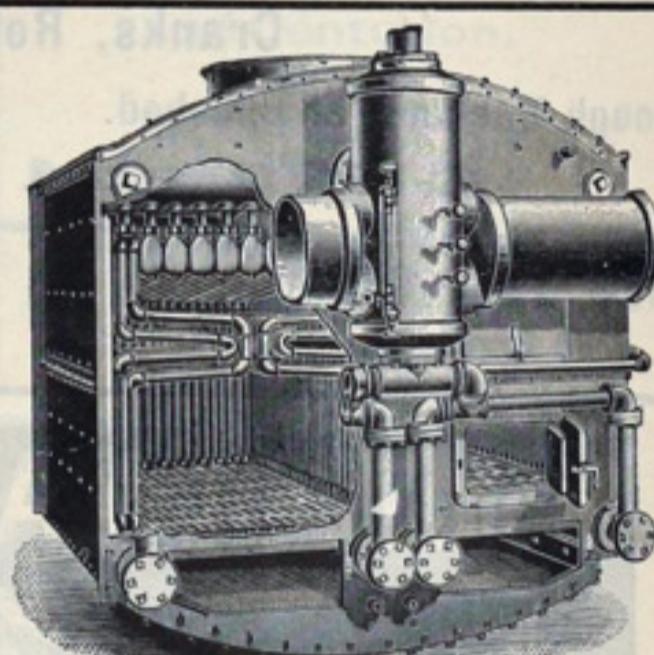
Single and Duplex Pumps for Boiler Feed,
Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps
for Surface and Jet Condensers.

95 and 97 Liberty St., NEW YORK.

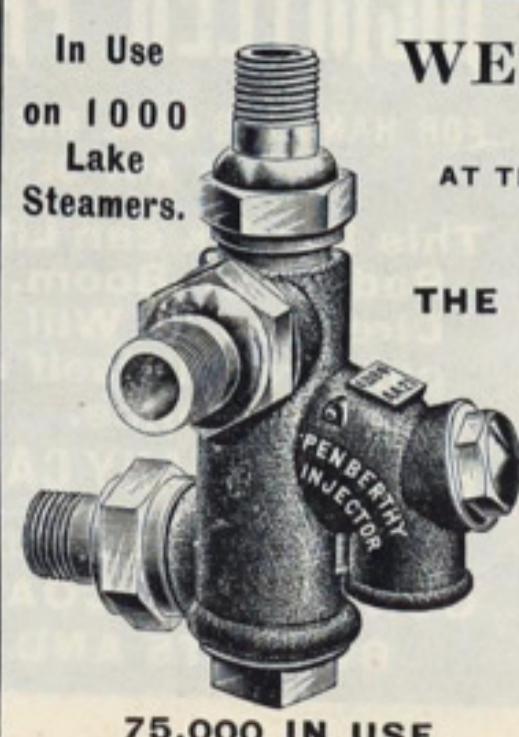
**ALMY'S PATENT
SECTIONAL WATER
TUBE BOILER.**

The Most Efficient and Reliable Water
Tube Boiler on the Market.
is neither a copy nor an infringement
of any other Boiler.

MANUFACTURED BY
The Almy Water Tube Boiler Co.,
No. 47 CLIFFORD STREET,
PROVIDENCE, R. I.



In Use
on 1000
Lake
Steamers.



WE WON EVERY HONOR
MEDAL, DIPLOMA, SPECIAL MENTION
AT THE **WORLD'S FAIR.**

THE **PENBERTHY** STILL LEADS
AMONG AUTOMATIC INJECTORS.

IT IS THE ONLY ONE THAT WILL GIVE
YOU SATISFACTION.

PENBERTHY INJECTOR CO.
Detroit, Mich.

75,000 IN USE.